



SP Energy Networks

Eastern Link – Torness Project

Options Appraisal Report

661767

FEBRUARY 2021



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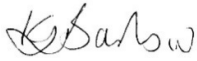

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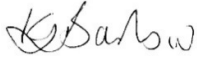
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CONTENTS

1	INTRODUCTION	4
1.1	This Document.....	4
1.2	Background.....	4
1.3	Purpose of Study	8
1.4	Project Parameters	8
1.4.1	Substation	8
1.4.2	Converter station.....	8
1.4.3	Underground AC cables.....	8
1.4.4	Underground HVDC cables	9
1.4.5	Cable landfall	9
1.4.6	Temporary construction compound.....	9
1.4.7	Future proofing.....	9
1.5	Structure of the Report	9
2	STUDY METHODOLOGY	11
2.1	Relevant Guidance	11
2.2	Relevant Previous Reports	14
2.3	Site Selection and Routeing	15
2.3.1	Defining the Study Area	15
2.3.2	Key Activities.....	15
2.3.3	Review of Previous Relevant Reports.....	15
2.3.4	Constraints Mapping	16
2.3.5	GIS Mapping and AGOL	18
2.3.6	Selection of Initial Site Options	19
2.3.7	Appraisal of Alternative Sites	20
2.3.8	Selection of Initial Cable Route Corridor Options.....	22
2.3.9	Appraisal of Alternative Route Corridor Options	23
2.4	Consultation.....	23
2.5	Limitations	24
3	ENVIRONMENTAL CHARACTER OF STUDY AREA.....	25
3.1	Introduction	25
3.2	Geology and Landform	25
3.3	Agriculture and Land Use	26
3.3.1	Land Capability Classification for Agriculture.....	26
3.3.2	Land Use.....	27
3.4	Access	27
3.5	Recreation and Tourism	28
3.6	Hydrology	29
3.7	Archaeology and Cultural Heritage	29
3.8	Landscape Character	30
3.8.1	Landscape Designations.....	30
3.8.2	Landscape Character.....	31
3.9	Visual Characteristics	34
3.9.1	Visual Sensitivity	34

3.10 Ecology and Nature Conservation	35
3.10.1 Designated Coastal Sites	35
3.10.2 Other Designated Sites	38
3.10.3 Habitats and Species	38
3.10.4 Surveys Required	40
3.11 Development and Planning	41
3.11.1 National Planning Framework	41
3.11.2 Scottish Planning Policy	41
3.11.3 South East Scotland Strategic Development Planning Authority	42
3.11.4 East Lothian Council Local Development Plan 2018	42
3.11.5 Scottish Borders Council Local Development Plan	44
3.11.6 Planning Application Search	45
4 APPRAISAL OF SITE OPTIONS	47
4.1 Site Options	47
4.2 Appraisal of Site Options	49
4.2.1 Environmental Constraints	49
4.2.2 Technical	51
4.2.3 Cost	51
4.2.4 Shortlisted Site Options	69
5 APPRAISAL OF ROUTEING OPTIONS	70
5.1 Route Corridor Options	70
5.2 Appraisal of Cable Corridor Options	71
5.2.1 Environmental Considerations	71
5.2.2 Technical and Cost Considerations	71
6 PREFERRED OPTION	76
6.1.1 Converter Station Options	76
6.1.2 Cable Route Options	78
6.1.3 Preferred Option	81
7 SUMMARY	82
8 REFERENCES	83

TABLES

Table 4.1: Initial Site Options	47
Table 4.2: Appraisal Criteria	50
Table 4.3: Site Options - Detailed Constraints Assessment (see Appendix 5)	
Table 4.4: Site Options - Summary of Constraints Assessment	53
Table 5.1: Routeting Options - Detailed Constraints Assessment (see Appendix 5)	
Table 5.2: Routeing Options - Summary of Constraints	72

FIGURES

Figure 1.1 – HVDC System Overview
Figure 2.1 – Study Area
Figure 3.1 – Agricultural Land Capability Classification
Figure 3.2 – Hydrology
Figure 3.3 – Historic and Landscape Designations
Figure 3.4 – Landscape Character Areas and Rights of Way
Figure 3.5 – Ecological Designations

Figure 3.6 – Nearshore Constraints
 Figure 3.7 – East Lothian Designations
 Figure 3.8 – East Lothian Landscape Designations
 Figure 4.1 – Initial Site Options
 Figure 4.2 – Initial Shortlisted Site Options
 Figure 4.3 – Ecological and Historic Designations - Initial Shortlisted Site Options
 Figure 4.4 – Residential Property Zones
 Figure 4.5 – Shortlisted Site Options
 Figure 5.1 – Potential Route Corridor Options
 Figure 5.2 – Ecological and Historic Designations - Route Corridor Options
 Figure 6.1 – Preferred Option

APPENDICES

APPENDIX 1 PHOTO LOG.....	86
APPENDIX 2 SUMMARY OF PLANNING APPLICATION SEARCH	87
APPENDIX 3 ZTVS	88
APPENDIX 4 LANDFALL SITE DESCRIPTIONS	89
APPENDIX 5 NEARSHORE SATELLITE IMAGERY	95
APPENDIX 6 CONSULTATION RESPONSES.....	96
APPENDIX 7 DETAILED ENVIRONMENTAL CONSTRAINTS TABLES (TABLE 4.3 AND TABLE 5.1).....	97

1 INTRODUCTION

1.1 This Document

RSK has been contracted by SP Energy Networks to provide environment services for the Eastern Link – Torness Project. The project forms part of the Eastern subsea HVDC link: Torness to Hawthorn Pit (E2DC) which is itself one of the links comprising in the wider Eastern Link reinforcement works which will facilitate increased power flows across the Scotland to England transmission network boundaries. This document is an Options Appraisal Report prepared to identify sites and corridors within the Torness locality that are potentially suitable to accommodate the required electricity transmission equipment.

1.2 Background

SP Energy Networks is the trading name for Scottish Power Energy Network Holdings Limited. SP Energy Networks owns and operates the electricity transmission and distribution networks in central and southern Scotland through its wholly-owned subsidiaries SP Transmission plc and SP Distribution plc. These businesses are ‘asset-owner companies’ holding the regulated assets and Electricity Transmission and Distribution Licenses. SP Transmission plc (SPT) is the transmission licensee. The references within this Appraisal Report to SP Energy Networks in the context of statutory duties and licence obligations should be read as applying to SPT.

SP Energy Networks has a legal duty to develop and maintain an efficient, co-ordinated and economical system of electricity transmission. It also has obligations pursuant to its licence conditions to make offers for connection (to the system operator) and to make its transmission system available for generators wishing to connect to it and ensure that the system is fit for purpose through appropriate reinforcements to accommodate the contracted capacity.

Significant offshore wind generation is being developed off the east coast of Scotland. The existing transmission network does not have enough capacity to cope with the level of connections required and therefore network reinforcements are required. SP Energy Networks currently has a connection agreement in place to connect Berwick Bank Offshore Wind Farm (OWF) to the transmission system¹. The substation forming part of the Eastern Link – Torness Project will provide the point of connection. In January 2021 National Grid Electricity System Operator published its sixth Network Options Assessment (NOA) which describes the major projects considered to meet the future needs of Britain’s electricity transmission system as outlined in the Electricity Ten Year Statement (ETYS) 2020 and recommends which investments in the year ahead would best manage the capability of the transmission networks against the uncertainty of the future.

The NOA (2021) recommends the development of a number of High Voltage Direct Current (HVDC) reinforcements between the east coasts of Scotland and England. These additional reinforcements will transport renewable and low carbon energy from Scotland

¹ Berwick Bank Offshore Wind Farm was previously known as Seagreen 2.

to England and will in turn support the UK and Scottish Government Net Zero targets and the transition to a low carbon economy. These transmission assets would primarily consist of marine HVDC subsea cables connected onshore via an onshore converter to convert between HVDC and High Voltage Alternating Current (HVAC) and vice-versa and would be bi-directional transmission reinforcements.

The NOA (2021) provides a recommendation to proceed with the following HVDC link projects between Scotland and England:

- Eastern subsea HVDC link: Torness to Hawthorn Pit (E2DC)
- Eastern Scotland to England link: Peterhead to Drax offshore HVDC (E4DC)
- Eastern Scotland to England 3rd link: Peterhead to the south Humber Offshore HVDC (E4L5)
- Eastern subsea HVDC link from south east Scotland to south Humber area (TGDC)

AC is the most widely used form of electricity transmission, however, both AC and DC are proven and reliable technologies. Each has their own advantages and disadvantages so their application will depend on particular circumstances such as the requirements of the transmission system, technical constraints or the aims of a given project.

The majority of the existing UK transmission system operates as AC; this is most common form of generating, transmitting and distributing electricity. DC technology has more commonly been used to “interconnect” the UK transmission system with electricity transmission systems in other countries including Northern Ireland, France and the Netherlands. These interconnectors allow for the bulk import and / or export of electricity between the transmission systems of different countries. DC technology is used as it allows electricity to be transmitted from point to point in much larger bulk volumes, over greater distances with fewer transmission losses compared to an equivalent AC system and it allows the connection of different systems.

A HVDC link on the UK transmission system can be used to do the same – namely the bulk transmission of electricity between two points on the existing network. This would allow large volumes of electricity generated in Scotland, where renewable energy generation is predicted to far exceed demand; to be transmitted to the south of the country where there is a much greater demand for electricity.

In this case, compared to a more conventional HVAC overhead line, the use of a subsea HVDC link has a number of benefits and can better meet the needs of the transmission system. It allows for:

- Transmission of electricity over very long distances with fewer transmission losses than an equivalent HVAC solution.
- Greater control over the transmission of electricity including ability to change size and direction of power flow.
- In this case a subsea HVDC link is a more cost effective solution relative to the other available technologies.
- A subsea HVDC link can be developed rapidly meeting the energy generation scenarios considered by NOA.

SP Energy Networks are working in partnership with Scottish Hydro Electric Transmission plc and National Grid Electricity Transmission plc to develop the Eastern Link E2DC and

E4DC Projects. It is anticipated that each Transmission Owner (TO) will be responsible for their own onshore consents (planning applications etc) and will jointly apply for marine licences.

The Eastern Link – Torness Project will enable the Eastern Link to come ashore and connect with the existing 400kV transmission line in the Torness area. It also provides a transmission connection to the Berwick Bank OWF and will increase capacity in the transmission network. The link requires a landfall location for the HVDC subsea cables; a new converter station (converting HVDC to AC electricity) and a new substation to be connected to the existing 400kV network. In addition, underground cabling is required to connect the landfall location to the converter station and onwards to the substation.

Figure 1.1 presents an overview of the HVDC system.

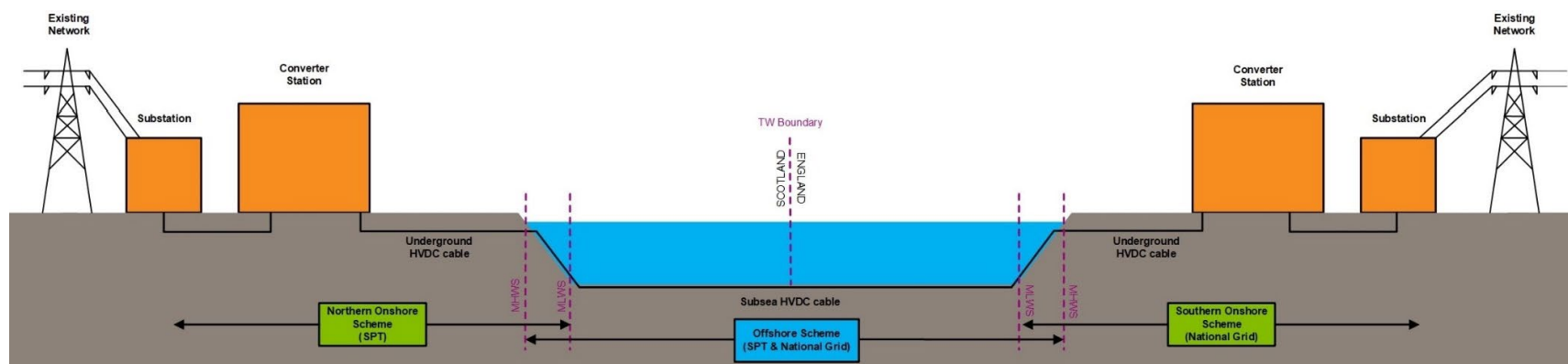


Figure 1.1: HVDC System Overview

1.3 Purpose of Study

The purpose of this study is to identify specific site and routing options for the following key components of the Eastern Link – Torness Project (the Project):

- Substation site;
- Converter station site;
- Landing point (landfall) for the subsea cables on the coastline, including consideration of nearshore constraints;
- The underground cable connection from the landfall to the proposed converter station site; and
- The underground cable connection from the proposed converter station site to the proposed substation site.

1.4 Project Parameters

At this stage of the Project, specific design details of the key project components have yet to be defined. As a result, for the purpose of this study, worst case assumptions have been adopted to reflect maximum land take associated with the key project components as detailed below.

1.4.1 Substation

An important element of the Project will be to provide a connection able to transfer electricity from the north to the south of the UK and vice versa. A new substation will be required and will link into the existing AC transmission network in Scotland. The substation will require a footprint of approximately 130m x 170m (2.2 ha). As far as constraints allow, the substation will ideally be located in close proximity to existing electrical infrastructure in order to minimise additional lengths of overhead line. Existing overhead lines and underground cables will require some amendments to bring them into the new substation. The substation will be the point of connection for the Berwick Bank OWF.

1.4.2 Converter station

Prior to electricity being exported from the transmission system in Scotland, there will be a requirement to convert its AC form into DC. In order to achieve this, specialist equipment will be required in the form of a converter station. The converter station will comprise a number of buildings and outdoor electrical equipment. It will be linked to the proposed substation via underground AC cables. The converter station will require a footprint of approximately 200m x 200m (4ha), with 30m maximum building height.

1.4.3 Underground AC cables

Delivery of the AC form of electricity from the substation to the converter substation will be achieved via onshore underground AC cables. The working width of the AC cable corridor will be approximately 40m.

1.4.4 Underground HVDC cables

Delivery of the DC form of electricity from the converter station will be achieved via onshore underground HVDC cables, connecting the converter station to a landfall (i.e. the interface between the onshore and marine environment) and onwards to the subsea HVDC cables. The working width of the DC cable corridor will be approximately 50m.

1.4.5 Cable landfall

The cable landfall is the main area of interaction between the onshore and marine components of the Project. At the landfall a working area will be required, with a footprint of approximately 100m x 100m (1ha), where the onshore and marine cables will be joined. The landfall will accommodate joint bays, equipment for a horizontal directional drill and other temporary construction equipment required to land the subsea HVDC cables and connect them to the onshore HVDC cables.

1.4.6 Temporary construction compound

A temporary construction compound will be required to facilitate the construction of the Project. The temporary construction compound will require an area of approximately 200m x 160m (3.2 ha). It is anticipated that there may be a requirement for more than one construction compound, depending on the location of the key components outlined above. However the total area required is unlikely to exceed 3.2 ha.

1.4.7 Future proofing

Although maximum parameters have been set for land requirements for the Project, in appraising site options, consideration has also been given at a high-level to potential future site expansion. As noted above, SP Energy Networks has an obligation to make its transmission system available for generators wishing to connect to it and ensure that the system is fit for purpose through appropriate reinforcements to accommodate the contracted capacity. This might include connections for onshore and offshore wind generators. Sites that have obvious constraints to possible future expansion would not be preferred. In accordance with published guidance for substation siting and design (National Grid Company plc, 2006), space within a site should be used effectively to limit the area required for development, whilst also having regard to future extension of the substation. The flexibility of a site to offer space to develop landscaping, ecological enhancement, drainage and flood compensation is also considered.

1.5 Structure of the Report

The contents of this report are structured as follows:

- Section 2 – Study Methodology;
- Section 3 – Environmental Character of the Study Area;
- Section 4 – Appraisal of Site Options;
- Section 5 – Appraisal of Routeing Options;
- Section 6 – Preferred Option;
- Section 7 – Summary; and

- Section 8 – References.

2 STUDY METHODOLOGY

2.1 Relevant Guidance

Under the Electricity Act 1989 SP Energy Networks is required to comply with the terms of its Transmission Licence. This requires compliance with their statutory duties including the requirement to “develop and maintain an efficient, coordinated and economical system of electricity transmission”, and, to facilitate competition in the supply and generation of electricity. Schedule 9 of the Electricity Act 1989 requires the company to do what it reasonably can to mitigate the environmental effects of proposals for new transmission infrastructure. Their statutory duties have underpinned the approach to developing the Project.

SP Energy Networks is required in terms of its statutory and licence obligations to make offers (to the system operator) where a connection to the transmission system is required by electricity generators. SP Energy Networks is also obliged to make its transmission system available for these purposes and to ensure that the system is fit for purpose through appropriate reinforcements to accommodate the contracted capacity.

The environmentally led approach to siting and routeing is driven by Schedule 9 of the Electricity Act 1989. This sets out SP Energy Network’s specific responsibilities with regard to the environment – to take into account environmental sensitivities and to mitigate the environmental disturbance resulting from its proposals where it reasonably can. It states that the transmission licence holder should take account of the following:

- To have a regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interests; and
- To do what it reasonably can to mitigate any effect that the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects.

The selection of site and routeing options has been conducted in general accordance with SP Energy Networks ‘Major Electrical Infrastructure Projects – Approach to Routeing and Environmental Impact Assessment’ (2015) (the Guidelines). The Guidelines set out SP Energy Networks approach to selecting a route for an overhead line and/ or underground cable in accordance with its statutory duties under the Electricity Act 1989.

SP Energy Networks approach to the routeing of underground cables is based on the premise that the most significant effects are likely to result from the construction of cable trenches and associated works, which may lead to vegetation changes which are visible when viewed from above. This is likely to be least visible in flat arable land, more visible in improved or semi-improved grassland used for grazing and most visible in upland semi-natural or natural ground cover. The best way to reduce or mitigate these effects is through careful route selection and successful habitat reinstatement. In addition, well routed cables take into account other environmental and technical considerations and seek to avoid, where possible, habitats which are difficult to reinstate. Appraisal criteria may include the following:

- Safety and reliability;

- Ease of access for construction and maintenance;
- Likely impact on the local environment during construction and ability to mitigate this;
- Disruption to third parties during construction and ability to mitigate this;
- Ground conditions, including risk of contamination and also ground stability;
- The need to cross wet areas and/or habitats that are difficult to reinstate successfully;
- Flood risk, proximity to water supplies and ability to cross watercourses at their narrowest point;
- Long term visibility of the cable route post construction, including the length that will be seen and the distance at which it will be visible;
- Likely long term loss of landscape features such as hedges or individual trees;
- Likely long term impact on known and unknown archaeology.

The Guidelines refer to The Holford Rules (Appendix 1 of the Guidelines) which form the basis for routing of high voltage overhead lines. The Holford Rules also include supplementary notes on the siting of substations as follows:

- Respect areas of high amenity value and take advantage of the containment of natural features such as woodland, fitting in with the landscape character of the area;
- Take advantage of ground form with the appropriate use of site layout and levels to avoid intrusion into surrounding areas;
- Use space effectively to limit the area required for development, minimising the effects on existing land use and rights of way;
- Alternative designs of substations may also be considered, e.g. 'enclosed', rather than 'open', where additional cost can be justified;
- Consider the relationship of towers and substation structures with background and foreground features, to reduce the prominence of structures from main viewpoints; and
- When siting substations take account of the effects of line connections that will need to be made.

The Guidelines also include reference to the Horlock Rules (National Grid Company plc, 2006) which provide guidelines for the siting and design of new substations, or substation extensions, to avoid or reduce the environmental effects of such developments. The Horlock Rules are also considered to be applicable to the siting of converter stations; the Horlock Rules have informed the siting and design of both the substation and converter station. The Horlock Rules include the following considerations:

Overall System Options and Site Selection

In the development of system options including new (or replacement) substations, consideration must be given to environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum.

Amenity, Cultural or Scientific Value of Sites

The siting of new (or replacement) National Grid Substations, CSE compounds and line entries should as far as reasonably practicable seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections.

Areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas should be protected as far as reasonably practicable.

Local Context, Land Use and Site Planning

The siting of Substations, extensions and associated proposals should take advantage of the screening provided by landform and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum;

The proposals should keep the visual, noise and other environmental effects to a reasonably practicable minimum;

The land use effects of the proposal should be considered when planning the siting of Substations or extensions.

Design

In the design of new substations or line entries, early consideration should be given to the options available for terminal towers, equipment, buildings and ancillary development appropriate to individual locations, seeking to keep effects to a reasonably practicable minimum.

Space should be used effectively to limit the area required for development consistent with appropriate mitigation measures and to minimise the adverse effects on existing land use and rights of way, whilst also having regard to future extension of the substation.

The design of access roads, perimeter fencing, earthshaping, planting and ancillary development should form an integral part of the site layout and design to fit in with the surroundings.

A detailed site and routeing appraisal has been undertaken which integrates consideration of environmental constraints and potential disturbance with technical feasibility, economic viability and deliverability. The aim of the study and the site/routeing selection objective is to identify, develop and assess a number of potential options and determine a preferred option that meets the technical requirements of the electricity system, which is economically viable and causes, on balance, the least disturbance to the environment and the people who live, work and enjoy recreation within it.

The initial stage is to determine a study area and gather baseline information within this area through desk-based studies, review of existing reports, site visits, and consultations in order to identify potential constraints and opportunities to siting and routeing.

To define a site/route that meets the requirements of the Electricity Act 1989, a balance must be struck between three considerations:

- Environmental;
- Economic; and

- Technical

Environmental Considerations

The site/routeing selection objective requires that the Project causes, on balance, the least disturbance to the environment and the people who live, work and enjoy recreation within it. This is underpinned by statutory duties imposed by Schedule 9 of the Electricity Act 1989. These require licence holders to seek to preserve features of natural and cultural heritage interest and mitigate where possible, any adverse effects which a development may have on those features. Experience across the electricity industry shows that an electricity infrastructure is likely to affect to varying degrees the following:

- Landscape and visual amenity
- Ecology, ornithology and nature conservation
- Cultural heritage

Other considerations which may affect siting and routeing to a greater or lesser degree include:

- Traffic (access for construction)
- Planning allocations and major applications
- Hydrology, flood risk and ground conditions
- Residential dwellings and land uses including agriculture and forestry
- Socio-economics (tourism and recreation)

Economic Considerations

In accordance with Schedule 9 of the Electricity Act 1989 the site/routeing appraisal objective requires the Project to be economically viable. This is interpreted by SP Energy Networks as meaning that as far as possible, and all other things being equal, the connections should be as direct as possible and the route and sites should avoid areas where technical difficulty or compensatory schemes would render the Project uneconomical.

Technical Considerations

The site/routeing selection objective requires that the Project is technically feasible. Technical considerations which can influence routeing potentially include existing infrastructure (in this case windfarms and the transmission network), altitude and slope angle, and physical constraints such as large water bodies. A key technical consideration for the substation is minimising the need to extend existing overhead lines over large areas.

These technical considerations are not considered as being absolute constraints but are a guide to routeing. The approach taken is to identify preferred environmental options informed by a staged review of technical issues.

2.2 Relevant Previous Reports

Previous Eastern Link onshore studies in the Torness region were undertaken by Wardell Armstrong in 2013 – 2014 and are reported in Eastern HVDC Link – Onshore Options, Strategic Environmental Assessment Report (Wardell Armstrong, May 2013) and Eastern HVDC Link – Onshore Options, Site Selection Report (Wardell Armstrong, March 2014).

These reports were reviewed and the findings incorporated into the options appraisal process as detailed below.

2.3 Site Selection and Routeing

2.3.1 Defining the Study Area

For the purpose of this study, a Study Area large enough to accommodate all route options taking account of topography and land use has been defined and also taking into account the findings of the previous Wardell Armstrong reports. The Study Area is based on an approximate 5km buffer from the previously identified preferred substation option R2 (preferred point to facilitate connection with the existing 400kV transmission lines in the Branxton/ Thornton area). This has been combined with a two nautical mile buffer from the coast (to encompass the nearshore area) extending from Dunbar and Siccar Point. The Study Area is presented in Figure 2.1.

2.3.2 Key Activities

The site selection and routeing study comprised the following key activities:

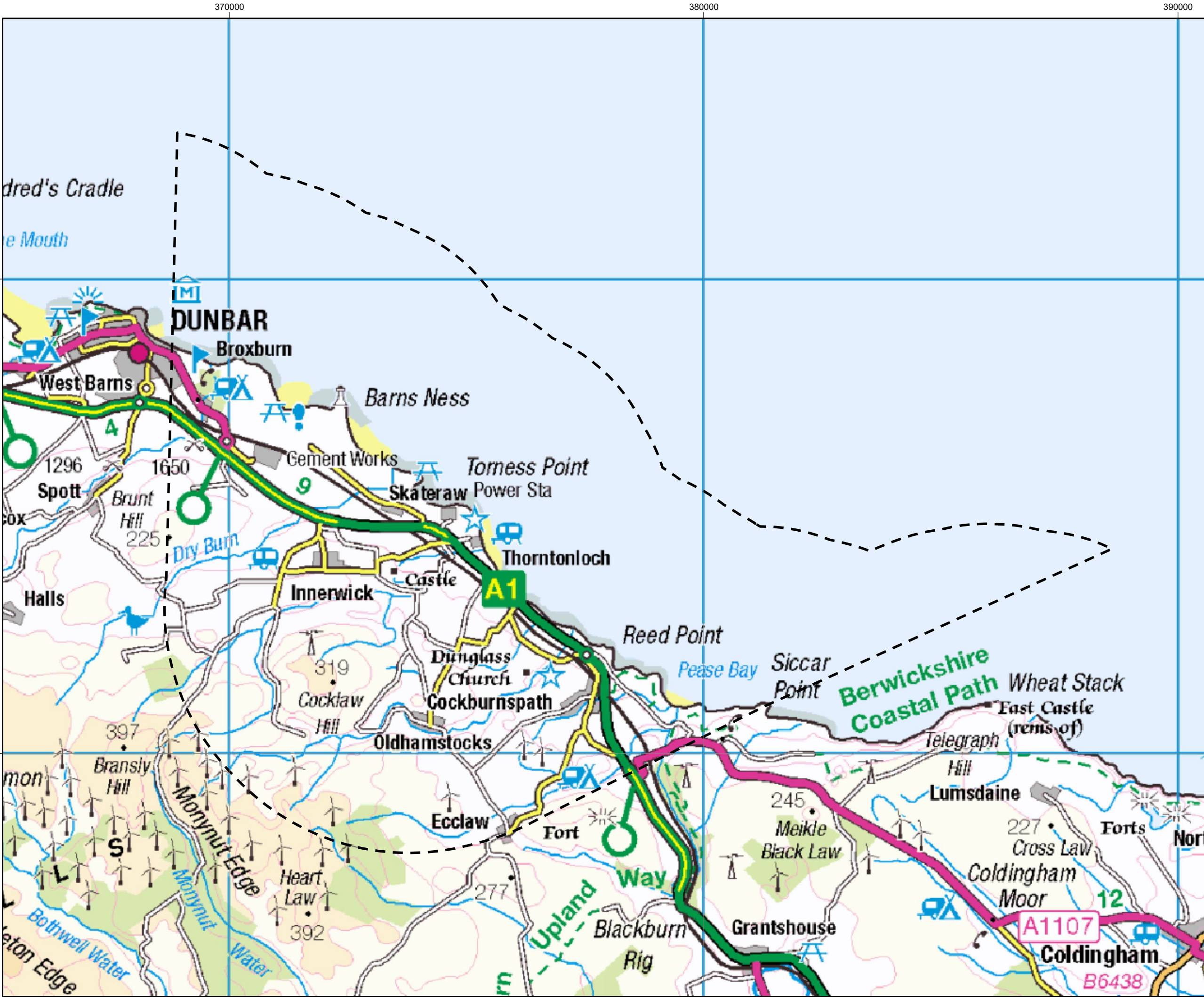
- Review of previous relevant reports;
- Identification and mapping of constraints within the Study Area likely to affect siting and routeing including environmental, socio-economic and land use;
- Review of local planning policy and allocations, including the digitising of relevant constraints;
- Identification of alternative sites (converter station, substation and landfall) within the Study Area;
- Identification of alternative cable route corridors between short-listed sites; and
- Identification of preferred site options (converter station, substation and landfall) and preferred cable route corridors.

These key stages are described further below.

2.3.3 Review of Previous Relevant Reports

As an initial task, RSK conducted a review of the previous Wardell Armstrong reports to gain a thorough understanding of previous Eastern Link onshore studies in the Torness region. Summaries of both reports are described below:

- **Wardell Armstrong: Strategic Environmental Assessment** (May 2013) – This report considered the potential for the development of sites within the Torness area, to accommodate new electricity transmission infrastructure that included a converter station, underground cabling and new cable landfall. Using GIS data a range of high-level environmental constraints (e.g. Sites of Special Scientific Interest, Ancient Woodlands, Scheduled Monuments, Listed Buildings etc) was compiled. This data was mapped enabling potential sites to be identified. Through further ‘ground-truthing’, site visits and a series of review meetings, six potential converter station sites, two potential substation sites and five possible landfall areas were identified and taken forward for further consideration within the next stage of the Project.



Legend:

Study Area

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

01	17/12/2019	Revised Title	DL	KB	KB
00	19/05/2020	Study Area	DL	KB	KB
Rev	Date	Description	Drn	Chk	App
Eastern Link - Torness Project					

TITLE: Figure 2.1:
Study Area

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- **Wardell Armstrong: Site Selection Report** (March 2014) – This report further investigates the converter and substation sites identified as part of the Strategic Environmental Assessment (May 2013). Following a high-level assessment, each site was ranked (in order of preference) based on their potential effect on cultural heritage, landscape character and visual amenity, nature conservation and traffic and transportation. Sites C and M1/M2/M3 were identified as preferred converter station site locations. Site R2 was identified as the preferred substation development site. Thorntonloch beach was identified as the preferred landfall location although it was acknowledged that the landfall location would be influenced by the selected site for the converter station. These sites are shown on Figure 4.1 of this report.

2.3.4 Constraints Mapping

As part of the RSK study an updated constraints mapping exercise was undertaken to identify and review all relevant interests within the defined Study Area (see Figures 3.1 – 3.8). Key constraints and potential issues considered when collecting background information have been outlined within Table 2.1. Further detail on the datasets collated is provided below.

Table 2.1: Summary of Key Constraints

Topic	Constraints/Issues
Environmental	Ecology (designations, habitats and species)
	Ornithology (designations, habitats and species)
	Landscape (designations and character)
	Visual amenity
	Archaeology and cultural heritage
	Recreation and tourism
	Ground conditions including contaminated land
	Hydrology and flood risk
	Residential dwellings
	Other land uses (e.g., transmission lines, mineral operations, agricultural and roads)
Technical	Slope/gradient (topography)
	Existing infrastructure (or in the planning process)
	Ground conditions

Topic	Constraints/Issues
	Presence of large waterbodies
Economic	Ensure viability – as far as reasonably possible - avoid areas where technical difficulty or compensatory requirements would render the scheme unviable on economic grounds.

2.3.4.1 High-Level Constraints Data

Key high-level international, national and regional environmental and land use constraints datasets were compiled for the defined Study Area. The constraints data was collated using readily available information held within the public domain from data sources including Scottish Natural Heritage (now known as NatureScot), Scottish Environment Protection Agency, Historic Environment Scotland and Sustrans. The data was downloaded from web-based sources to RSK servers. Archaeological and heritage data was obtained from the East Lothian Council Historic Environment Record (HER), Scottish Borders HER, non-designated assets within the National Record of the Historic Environment (NRHE, or Canmore), and designated assets recorded by Historic Environment Scotland. The following constraints formed the basis of this stage of the study:

- Special Area of Conservation (International)
- Special Protection Area (International)
- World Heritage Sites (International)
- Ramsar sites (International)
- Site of Special Scientific Interest (National)
- Geological Conservation Review Sites
- National Nature Reserve (National)
- Wildlife Reserve
- Gardens and Designed Landscapes (National)
- Scheduled Monuments (National)
- Category A, Category B and Category C Listed buildings (National)
- Properties in Care (National)
- Battlefields (National)
- Ancient Woodland (National)
- Conservation Area (National)
- Historic Environment Record data (National)
- National Record of the Historic Environment data (National)
- Landscape Character Areas (National)

- National Cycle Route
- National Vegetation Classification
- Flood Zones
- Marine Consultation Areas
- Country Parks
- Land Capability Classification for Agriculture

2.3.4.2 Local Constraints Data

Key local environmental and land use datasets were reviewed for the defined Study Area. The data was accessed via the East Lothian Council website including a review of Local Development Plan 2018 proposal maps (pdf), and via the Scottish Borders interactive mapping tool. Digital data was also obtained from East Lothian Council for specific designations including:

- Core Paths (digitised)
- Local Biodiversity Sites
- Local Geodiversity Sites
- Special Landscape Areas
- Policy designations under the East Lothian Local Development Plan

Relevant East Lothian local designations for the Study Area are presented in Figures 3.7 and 3.8. Historical landfill data was also obtained from East Lothian Council.

2.3.4.3 Residential Data

Address base data was purchased for the Study Area in order to map the location of residential properties and to be considered as part of the options appraisal process (see Figure 4.4).

2.3.4.4 Planning Applications

A planning application search within the Study Area was conducted using East Lothian Council and Scottish Borders Council planning portal. The planning application search was refined to only include planning applications submitted within the last five years that are outside settlement development boundaries.

Section 3 of this report provides high level, baseline information on various aspects of the Study Area and its surrounding environment.

2.3.5 GIS Mapping and AGOL

The listed constraints data was incorporated into GIS, providing a layering of information to facilitate effective and efficient data interrogation, analysis and editing. This formed a basis for interrogating priorities and comparative analysis of siting options.

GIS constraints were mapped at various scales. A secure web-based GIS platform (ArcGIS Online) was also established for the Project which allowed named users within the project team to view the collated data layers together with the project parameters.

2.3.6 Selection of Initial Site Options

The following key principles were considered with respect to the selection of converter/substation site options:

- Availability of sufficient space to accommodate the Project;
- Minimising close proximity to residential properties as far as practicable;
- Minimising potential direct impacts upon key environmental receptors including natural heritage, cultural heritage, and landscape and visual receptors;
- Availability of natural and/or existing screening in the landscape;
- Potential to mitigate visual impacts via the introduction of new planting and/ or earthworks;
- Availability of suitable access; and
- Minimising the sterilisation of land for known planned development (primarily those allocated within statutory local plans and potential future grid connection developments).

With respect to the selection of landfall options, the following principles were considered:

- Availability of suitable terrain and substrate with a view to facilitating 'standard' methods of landfall cable installation e.g. trenching methods;
- Availability of space to accommodate the Project;
- Minimising potential direct impacts upon key environmental receptors including natural heritage, cultural heritage, and landscape and visual receptors; and
- Availability of suitable access.

Initial identification and appraisal of potential substation, converter station and landfall sites was undertaken using GIS mapping (as described in Section 2.3.4). The mapping identified areas of potential environmental and land use constraints within the Study Area. Mapping was used to exclude development within the following areas (as far as possible) in order to minimise potential direct impacts upon key environmental receptors including natural heritage, cultural heritage, and landscape and visual receptors:

- Designated European sites² (Special Areas of Conservation and Special Protection Areas).
- Ramsar sites³
- Areas of Great Landscape Value;
- Ancient Woodland;
- World Heritage Sites; and
- Scheduled Monuments.

The following were also considered:

- Location of watercourses and waterbodies;

² Previously known as Natura sites

³ Most Ramsar sites in Scotland are linked to the Natura 2000 network - either as a [Special Protection Area](#) (SPA) or [Special Area of Conservation](#) (SAC). All are underpinned by [Sites of Special Scientific Interest](#) (SSSIs).

- General gradient of the land;
- Locations of existing infrastructure (roads, railway lines); and
- Locations of existing electricity transmission/ distribution infrastructure.

The proposed short-listed site options (C, D1, D2, E1, E2, G, L2, M1, M2, M3, Q, R1, R2) as identified in the previous Wardell Armstrong study were included in the list of initial site options. Additional site options (CD1, CD2, CD3, G1 and RSK1) were also identified by SP Energy Networks/RSK for consideration. The five potential landfall options identified as part of the Wardell Armstrong study (White Sands Beach, Shoreline between Barnes Ness and Chapel Point, Skateraw Harbour, Thorntonloch Beach and Small Bay, east of Thorntonloch Beach) were included in the initial list of landfall options as well as three additional options located at Barnes Ness North, Cover Harbour and Pease Bay.

Site visits were undertaken specifically in relation to the topics of landscape, nature conservation (terrestrial and intertidal), traffic and access, and land use/ planning. The purpose of site visits was to:

- 'Truth' the data captured during the desk-based element of the study, as far as practical;
- Identify any additional potential site options;
- Identify further constraints that may be present, but had not been identified through the desk-based element of the study; and
- Undertake a field appraisal of the options in order to inform the overall selection process.

Site visits were undertaken on 1-2 October 2019 (landscape verification), 23-24 October 2019 (landfall visits), and 31 October 2019 (traffic and access verification). Section 4 of this report provides information on the initial site options that were considered.

In February 2020, a number of Zones of Theoretical Visibility (ZTVs) were prepared for the converter station site options (assuming a 30m height) to illustrate the likely maximum extent of theoretical visibility of each site option across the study area.

2.3.7 Appraisal of Alternative Sites

Those sites considered potentially feasible following ground-truthing were taken forward for options appraisal. Each feasible converter station, substation and landfall option has been appraised against the following key environmental aspects which are likely to influence the selection of a preferred location:

- Landscape and Visual;
- Ecology;
- Historic Environment; and
- Transport and Access.

Consideration was also given to other factors including key land use issues (including flood risk and contaminated land), and technical and economic constraints (including cable connection distances).

In terms of landscape and visual aspects, the analysis of the individual potential converter station/ substation sites considered:

- The presence or absence of international and national designated or non-designated landscape areas within the approximate site boundary;
- The presence or absence of locally designated Special Landscape Areas within the approximate site boundary;
- The proximity to settlements and more rural isolated dwellings, and the degree to which existing features (e.g. woodland belts) contribute to visual containment;
- The presence of any rights of way, access routes or other recreational receptors such as local caravan and holiday parks;
- The proximity of the site to existing industrial and/ or energy infrastructures and local landscapes which would have a lower sensitivity to the introduction of either a converter station or substation; and
- The level of visual containment or exposure provided by the local landform.

Landscape and visual aspects were not included as a key consideration for the landfall site options as it is assumed that permanent infrastructure at the landfall would be buried. Any impacts during construction would be temporary in nature.

In terms of ecological aspects, the analysis of the individual potential converter station/ substation sites considered:

- The presence or absence of designated or non-designated ecological sites within the approximate site boundary;
- The potential presence of sensitive habitats;
- The potential presence of habitat suitable to support protected or otherwise notable species;
- The presence of waterbodies such as ponds within 500 m of the site boundary.

Ecological factors considered for the landfall options focused on the presence or absence of designated or non-designated ecological sites at the coast and the potential presence of sensitive habitats.

In terms of historic environment, the analysis of the individual potential converter station/ substation sites considered:

- The presence or absence of known designated or non-designated heritage assets within the approximate site boundary;
- The presence or absence of designated or non-designated heritage assets within the immediate area surrounding the site boundary, indicative of potential for hitherto unknown archaeological remains to be present within the site and its vicinity (based on the presence and nature of known sites within or close to the site, as well as any known areas of disturbance affecting the area); and
- The potential for impacts on the setting of heritage assets from the Project.

Consideration of historical issues for the landfall options focused on the presence or absence of designated or non-designated heritage assets at the coast (including the nearshore environment).

In terms of transport and access, the analysis of the individual potential converter station/ substation sites considered:

- The presence or absence of existing access routes;
- Ease of access for general construction traffic based on any access restrictions;
- Ease of access and the potential for improvement for abnormal load movements; and
- Proximity of routes to residential properties which have the potential to be affected by traffic-related impacts.

Transport and access considerations for the landfall options focussed on ease of access.

An assessment of each of the siting options in terms of technical and cost issues was completed by SP Energy Networks engineers. Advice on engineering constraints in the nearshore relating to potential landfall locations was provided by 4C Offshore Limited.

The purpose of the comparative appraisal of site options is to identify an 'emerging preferred converter station, substation and landfall site'. In line with the site selection objective, the preferred site for the converter station, the site for the landfall, and the site for the substation is the option which is technically feasible and economically viable whilst causing the least disturbance to the environment and to people, of all the options considered. As part of the appraisal process, stakeholder feedback on the options considered was sought. This included an options appraisal workshop held in July 2020 with members of the planning and landscape teams at East Lothian Council, NatureScot, SEPA and Historic Environment Scotland. Discussions were also held with EDF Energy (EDF) in terms of the licenced nuclear site boundary.

The preferred converter station, substation and landfall site selected following options appraisal process will be taken forward for further stakeholder consultation and public consultation. Section 4 presents the findings of the appraisal of alternative sites.

2.3.8 Selection of Initial Cable Route Corridor Options

Following the initial appraisal of converter station, substation and landfall options, a short-list of options was identified. Those sites with the least relative potential to accommodate the required infrastructure within the context of the environmental, technical and economic constraints were excluded from further consideration. For the short-listed sites, potential cable corridor options from landfall to converter station and from converter station site to substation were identified. The corridors were identified using GIS mapping of environmental constraints data and aerial photography. The mapping was used to locate corridors (as far as possible) giving consideration to:

- Land use and planning constraints, i.e. avoidance of dwellings and other occupied premises;
- Ecological constraints, i.e. avoidance of designated sites, known/potential habitats and other ecological sensitivities;
- Cultural heritage constraints, i.e. avoidance of designated sites and known/potential assets;
- Water features, i.e. consideration of key watercourse crossing, and proximity to waterbodies; and
- Transport links and access, i.e. access to working areas.

2.3.9 Appraisal of Alternative Route Corridor Options

The cable route corridor options were appraised against the following key environmental aspects which are likely to influence the selection of a preferred cable route:

- Ecology;
- Historic Environment; and
- Transport and Access;
- Landscape and Visual.

Factors including cable crossings (eg watercourses, rail and road crossings), corridor length and the position of 'pinch points' were also taken into account during the corridor appraisal.

An assessment of each of the cable corridor options in terms of engineering (including topographical and geological features, ground conditions, access, crossing positions at watercourses, utility crossings, ground suitability and flood risk), technical and cost issues was completed by Cable Consulting International Ltd (CCI).

The purpose of the comparative appraisal of route corridor options is to identify an 'emerging preferred route'. The preferred route is the option which is technically feasible and economically viable whilst causing the least disturbance to the environment and to people, of all the options considered. This will then be taken forward for stakeholder and public consultation. Section 5 presents the findings of the appraisal of cable corridors.

2.4 Consultation

An introductory briefing to the Project was provided to statutory consultees at meetings held on 18 June and 23 June 2020. Representatives from the following organisations attended the meetings:

- East Lothian Council
- Scottish Natural Heritage (now known as NatureScot)
- Historic Environment Scotland
- Scottish Environmental Protection Agency

A consultation workshop was held on the 23 July 2020 with East Lothian Council to present the options appraisal process and to discuss site options identified. An interactive digital StoryMap presentation was used to facilitate the discussion. Access to this digital platform was provided to East Lothian Council following the workshop.

Feedback on the options appraisal process and site options was also requested and obtained from the following consultees:

- Nature Scot
- Historic Environment Scotland

A further meeting was held with East Lothian Council on 23 September 2020. This meeting was held jointly with SSE Renewables to facilitate joint discussion on the Project and the Berwick Bank Offshore Wind Farm project.

SP Energy Networks met with EDF on 15 July 2020 and provided an introductory briefing and discussed site options identified.

Feedback from consultation on the options appraisal process and site options has been taken into account within this study. A summary of the consultation responses is provided in Appendix 6.

Further consultation is proposed with these authorities and other relevant parties as the Project progresses.

2.5 Limitations

At this stage of the Project, specific design details of the key Project components have yet to be defined. As a result, worst case assumptions have been adopted to reflect maximum land take required. Whilst preliminary design parameters give a good indication of likely impact, this cannot be determined in detail until the proposed design is developed and further consultations are undertaken.

The ecological aspects of options appraisal have been completed based on a review of aerial photography and a site visit. No Extended Phase 1 habitat survey has been completed at this stage. The assessment of the suitability of the site for protected and/or notable species has therefore been based on the habitats identified through review of aerial photography and the known range and habitat requirements of relevant species. It is possible that areas suitable for protected and/or notable species could be present that have not been highlighted within the options appraisal. An ecological impact assessment including a Phase 1 Habitat survey and protected species surveys will be undertaken for the preferred option as part of the next stage of the Project.

3 ENVIRONMENTAL CHARACTER OF STUDY AREA

3.1 Introduction

This section of the Options Appraisal Report provides high level, baseline information on various aspects of the Study Area and its surrounding environment. This information will be used as part of the selection process for the substation, converter station and landfill site options and cable corridor options.

The Study Area encompasses an area west of Dunbar to Siccar Point. The majority of the Study Area sits within the jurisdiction of East Lothian Council, with a small proportion in the south of the Study Area located in the Scottish Borders.

3.2 Geology and Landform

The landform of the Study Area transitions between the high ground in the west at the eastern extent of the Southern Uplands as they fall towards the eastern Scottish coastline. The high ground within the Study Area is on the edge of the Lammermuir Hills and comprises predominantly Silurian conglomerates and greywackes. The eastern Lammermuir Hills are characterised by steeply incised valleys known locally as 'cleughs' or 'deans'. Moving east, towards the coastal plain, Carboniferous sandstones and limestones dominate. A narrow band of Devonian sandstones is present in the southern part of the Study Area.

The landform of the Study Area falls gradually towards the coast with relatively shallow gradients other than in the 'cleughs' or 'deans'. The further inland, the steeper the landform becomes with the steepest gradients approaching 1 in 2.5.

The superficial geology is characterised by glaciofluvial deposits along the coastal plain, giving way to glacial till further inland. The coastal strip has some marine beach and raised beach deposits and alluvial deposits are present along the main river valleys. Some of the higher areas and steep slopes in the south-west and west of the Study Area have no mapped superficial deposits.

Bedrock exposure within the Study Area is predominantly limited to the coastal section and incised river valleys. The areas indicated to have no superficial deposits, in the south-west and west of the Study Area, are likely to have bedrock close to the ground surface. There are no areas of former mine workings within the Study Area, although there are three active quarries present. One quarry is located near Dunbar in the northern part of the Study Area, and the other two are near Cocksburnpath in the southern part of the Study Area. Landfill records show that there is a landfill site located to the west of Torness Nuclear Power Station; the landfill is labelled as waste management with an inert waste type which closed in 1993. Barns Ness Geological Conservation Review (GCR) site, Cove GCR site, Hawk's Heugh GCR site and Oldhamstock Gullies GCR site are located within the Study Area. The majority of GCR sites are recorded for their geological and geomorphological interest at localities already notified or being considered for notification as Sites of Special Scientific Interest (SSSIs). Section 3.10 below provides further details on SSSIs. The Study Area also includes Local Geodiversity Sites at Dunbar Shore and Thorntonloch.

East Lothian Council's Shoreline Management Plan (2002) notes that the coast is dynamic, with areas experiencing periods and cycles of erosion and accretion. In August 2017, the Scottish Government launched the Dynamic Coast project to deliver an assessment of coastal changes across Scotland's erodible shores and to provide a robust evidence base from which to plan strategically. The project supports existing strategic planning (Shoreline Management Plans, Flood Risk Management Planning, Strategic and Local Plans, National and Regional Marine Planning etc.) and identifies those areas which may remain or may become susceptible to erosion in the coming decades and require supplementary support. Dynamic Coast online maps are available; however, they are developed as a strategic tool rather than to inform detailed local assessments. Hansom *et al* (2017) identifies areas along the East Lothian coastline with future vulnerability to erosion.

A review of the Scottish Government's Scotland Soils interactive map tool (The Scottish Government, 2017) indicates that soils within the Study Area are mainly brown earths, with some mineral gleys and alluvial soils, and are largely freely draining. There are very few areas of peatland/peaty soils within the Study Area. The Carbon and Peatland map confirms that the vast majority of the Study Area is underlain by mineral soils. There are no nationally important carbon-rich soils present in the area.

3.3 Agriculture and Land Use

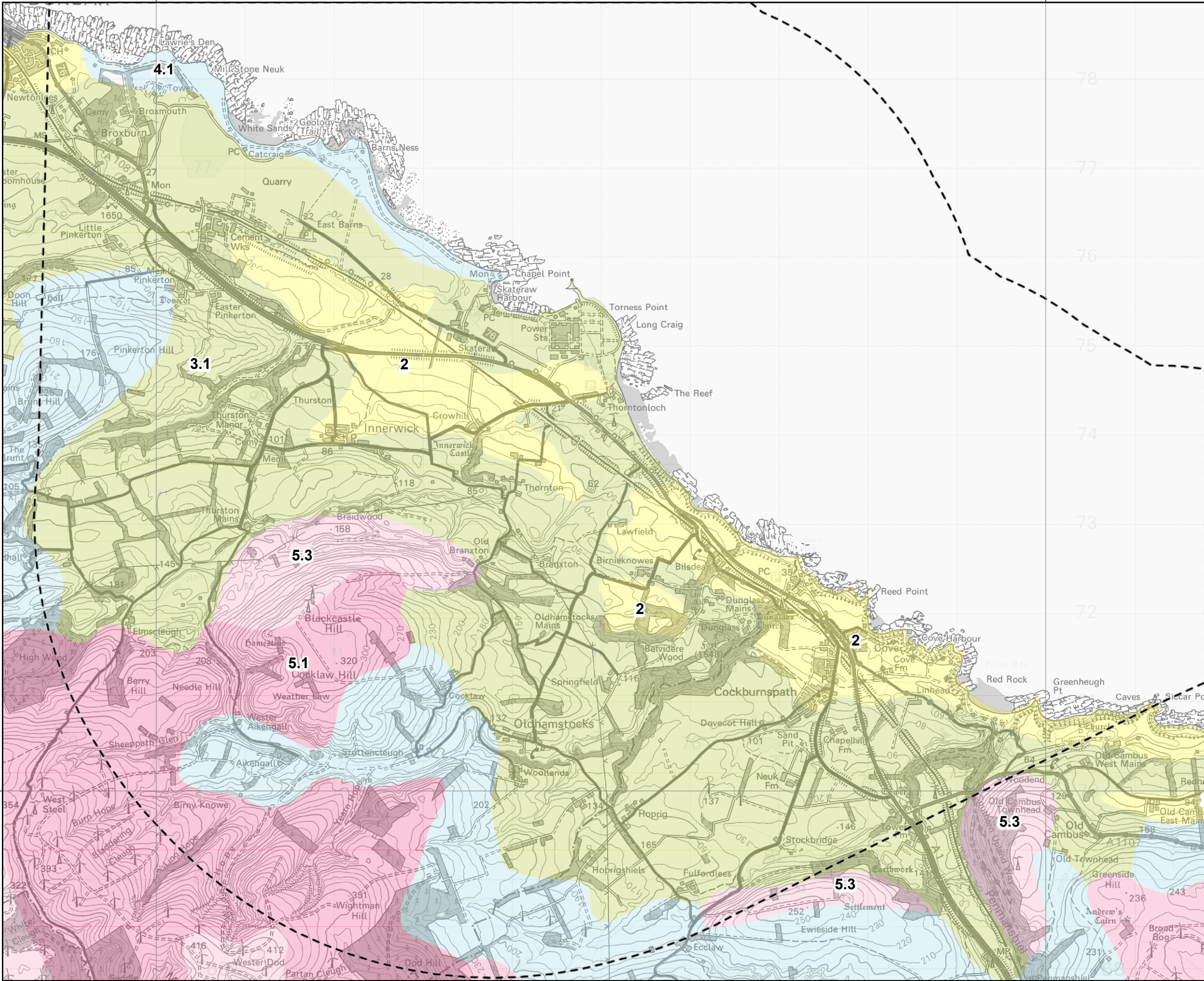
3.3.1 Land Capability Classification for Agriculture

Land Capability Classification for Agriculture (LCCA) is a standardised system used to classify land on its potential productivity and cropping flexibility. LCCA is applied through a series of guidelines to ensure a high degree of classification consistency between users. The system uses soil characteristics, climate and relief to grant agricultural land as classification between one and seven. Class 1 represents land capable of producing a very wide range of crops with the highest potential crop flexibility, to Class 4 that represents a land capable of producing a narrow range of crops (i.e. Classes 1 to 4 are suitable for arable use), down to Class 7 that represents land of very limited agricultural use.

Using the Scottish Government's Scotland Soils interactive map tool (The Scottish Government, 2017), the following LCCA grades (national scale) are present within the Study Area:

- Grade 2 land
- Grade 3.1 land
- Grade 4.1 land
- Grade 5.1 land
- Grade 5.3 land

The coastal areas and hinterland within the Study Area are dominated by Grade 2, Grade 3.1 and Grade 4.1 land, with Grade 5.1 and Grade 5.3 land appearing on the western edge of the Study Area (see Figure 3.1). Due to the location and extent of the Grade 2 and Grade 3.1 land some impacts on this aspect are likely to be unavoidable when selecting potential converter station and substation sites.



- Legend:**
- Study Area
 - 2- Land capable of producing a wide range of crops.
 - 3.1 - Land capable of producing consistently high yields of a narrow range of crops and/or moderate yields of a wider range. Short grass leys are common.
 - 3.2 - Land capable of average production through high yields of barley, oats, and grass can be obtained. Grass leys are common.
 - 4.1 - Land capable of producing a narrow range of crops, primarily grassland with short arable breaks of forage crops and cereal.
 - 4.2 - Land capable of producing a narrow range of crops, primarily on grassland with short arable breaks of forage crops.
 - 5.1 - Land capable of use as improved grassland. Few problems with pasture establishment and maintenance and potential high yields.
 - 5.2 - Land capable of use as improved grassland. Few problems with pasture establishment but may be difficult to maintain.
 - 5.3 - Land capable of use as improved grassland. Pasture deteriorates quickly.
 - Urban

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

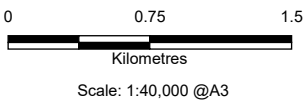


Rev	Date	Description	Drn	Chk	App
01	17/12/2020	Revised Title	DL	KB	KB
00	19/05/2020	ALC	DL	KB	KB

Eastern Link - Torness Project



TITLE: Figure 3.1:
Agricultural Land Capability Classification



3.3.2 Land Use

Land use within the Study Area is predominately agricultural, particularly within the coastal hinterland. The presence of productive agricultural land and exposed coastline give rise to the settlement pattern within the Study Area. Cockburnspath and Oldhamstocks are the largest settlements within the Study Area and both are found to the south. Outside the Study Area, Dunbar is found to the north. Other than the settlements mentioned, the Study Area consists of small villages that include Innerwick, Thornton and Oxwell Mains that are sparsely located along the coastline. Smaller clusters of properties are located elsewhere such as at Skateraw, Broxburn and Cove. Other major infrastructure within the Study Area includes Torness Nuclear Power Station, a major cement works (Dunbar Cement Plant) and limestone quarry and Dunbar Energy Recovery Facility and adjacent active landfill site, all located south of Dunbar.

The coastal waters are of importance for commercial fisheries, and the Study Area is within International Council for the Exploration of the Sea (ICES) statistical rectangle 40E7 and fishing activities up to 6 nautical miles (nm) offshore are represented by the North & East Coast Regional Inshore Fisheries Group (RIFG). The main species commercially targeted are Nephrops (*Nephrops norvegicus*), European lobster (*Homarus gammarus*), scallops (principally king scallop - *Pecten maximus*) and brown crab (*Cancer pagurus*). Vessels targeting Nephrops also target squid (*Loligo forbesi*). Most vessels operating in the inshore region are under 15m in length and are from local ports such as North Berwick, Pittenweem, Dunbar, Eyemouth or smaller ports. Other small artisanal fisheries are present in the area, mostly targeting bivalves and mackerel for use as bait (Mainstream Renewable Power, (2009); Scottish Government, 2017).

The Royal National Lifeboat Institution (RNLI) operates the all-weather Dunbar lifeboat, with moorings inside the breakwater at Skateraw Harbour at Torness Nuclear Power Station covering the area from St Abb's Head to Fife Ness and up to 100 miles offshore (SEPA, 2016).

3.4 Access

The main transport routes through the Study Area are:

- A1, which runs north to south through the Study Area generally around 500m inland from the coast and connects the north of England and Edinburgh; and
- East coast rail.

Along the coast, access to the intertidal and nearshore area is generally straightforward with the main road (A1) running parallel to the coast. There are numerous connections from the A1 to the coast and nearby settlements. Further south within the Study Area access is more restricted due to steep cliffs, yet certain areas are still accessible via gaps in the cliffs and public walkways down through tunnels (such as the case of Cove Harbour). The majority of beaches and coves have car parking facilities and other infrastructure for visitors such as public toilets and information boards.

There are other minor local roads within the Study Area connecting the small settlements, such as Innerwick, with the wider highways network and larger towns outside the Study Area such as Dunbar and Edinburgh beyond.

Berwick-upon-Tweed railway station to the south and Dunbar railway station to the north are the nearest stations on the East Coast mainline railway. An extensive network of minor roads, tracks and Public Rights of Way (PRoW) allow access to isolated properties and connect communities to the wider area.

3.5 Recreation and Tourism

As the Study Area includes approximately 16km of coastline, access and recreation are important uses of the area. Undulations in the coastline create headlands and bays where beaches, such as Thorntonloch Beach and Cove Harbour, create informal recreational areas throughout much of the year. Dunbar Golf Club is situated in the north of the Study Area, whilst other facilities including picnic areas are sparsely located along the coastline. There are several caravan parks situated throughout the Study Area including Thurston Manor Leisure Park and Pease Bay Leisure Park.

The coastal area is busy with recreational activities. Dog walkers, hikers and bird watchers frequent the coastline. Several of the beaches and reefs are popular surf spots, wrecks are popular with scuba-divers and recreational fishers are common (Mainstream Renewable Power, 2012). A local surf school reported that around 50 local people surf in the area, but the beaches attract up to 10,000 surfers annually from elsewhere, such as nearby towns and cities including Glasgow and Edinburgh (SEPA, 2016). Other activities such as climbing, coasteering, kayaking and windsurfing are also popular with tourists in the summer season (East Lothian, 2019c).

Recreational fishers are drawn to the area, particularly around Torness Nuclear Power Station as the warmer water resulting from cooling water discharge attracts fish. Anglers also target areas such as Whitesands and Dunbar for bait digging, rod-fishing at Thorntonloch for mackerel, bass and cod, and shore fishing at Skateraw Harbour for mackerel and pollock (SEPA, 2016). Molluscs, crustaceans, seaweed and other wild foods are also collected in the area (SEPA, 2016).

There are several footpaths within the Study Area, the most popular of which follow the coastline through the Study Area. The John Muir Link is a coastal path which connects the long-distance trails of The John Muir Way (in Dunbar) to the Southern Uplands Way (in Cockburnspath). In addition, National Cycle Route No. 76 runs through the Study Area, following the coastline, travelling through Dunbar to Cockburnspath and then continuing south-east heading towards the English-Scottish border.

Various other rights of way including Core Paths, Permissive/ Customary Paths and Public Rights of Way span the Study Area. They are generally of short length connecting groups of properties and the local road network creating access for more rural communities such as Innerwick and Oldhamstocks.

The coastal area is a tourist destination, with caravan parks and small hotels situated along the coastline such as at Thorntonloch and Pease Bay. Car parks and facilities are located at many of the beaches within the Study Area. The larger Thurston Manor Leisure Park is located 2.5km inland and west of Innerwick. In addition to the beach areas and coastal walks, other attractions within the Study Area include Dunbar Golf Club, Broxmouth Park (providing holiday accommodation and event venue), and Torness Nuclear Power Station Visitor Centre.

3.6 Hydrology

A high-level desk study of hydrological characteristics and features within the Study Area has been undertaken. This information has been collated using the following resources:

- Ordnance Survey Mapping; and
- SEPA website (for waterbody classification and flood risk).

Using available OS mapping, the following watercourses flow through the Study Area (in order from north-west to south-east):

- Spott Burn/Brox Burn
- Dry Burn
- Thurston Mains Burn/Thornton Burn
- Elmscleugh Water
- Aikengall Water
- Ogle Burn
- Bilsdean Burn
- Oldhamstocks Burn/Dunglass Burn
- Cockburnspath Burn
- Kailis Burn/Heriot Water/Tower Burn/Pease Burn

Generally, the watercourses flow in an easterly direction, towards the coast, passing through predominantly rural areas (see Figure 3.2).

Five of the watercourses have been classified by SEPA on the basis of their water quality, morphology and ecology. The Spott Burn and Dry Burn/Woodhall Burn both have Moderate overall classification. The Thornton Burn/Thurston Mains Burn, Dunglass Burn/Oldhamstocks Burn and Tower Burn (Pease Burn) all have Good overall classification.

According to SEPA's flood risk classification, high, medium and low level river flood risk is confined to the immediate bankside length of Spott Burn, Dry Burn, Thornton Burn, Bilsdean Burn, Dunglass Burn, Cockburnspath Burn, Tower Burn and Pease Burn. Various classifications of surface water flood risk (high, medium and low risk) are situated in small, isolated sections of the Study Area. Along most of the coastline, SEPA classifies the coastal flood risk as high with small areas classified as medium risk.

Thirteen private water supplies have been identified within the Study Area. A risk assessment exercise will be undertaken once preferred locations and routes have been identified.

3.7 Archaeology and Cultural Heritage

The Study Area is host to two battlefield inventory sites south of Dunbar; the First Battle of Dunbar inventory battlefield (Ref: BTL31) and the Second Battle of Dunbar inventory battlefield (Ref: BTL7), designated heritage assets of National importance.



Legend:

- Study Area
- Watercourse (OS Opendata)

River (SEPA)

- Good Status
- Moderate Status
- Poor Status

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

Rev	Date	Description	Drn	Chk	App
01	08/12/2020	River Labels Added	DL	KB	HB
00	19/05/2020	Hydrology	DL	KB	KB

Eastern Link - Torness Project

TITLE: Figure 3.2:
Hydrology

2

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There are three conservation areas within the Study Area, located around the villages of Oldhamstocks, Innerwick and Cockburnspath.

There are two Inventory Gardens and Designed Landscapes at Broxmouth Park, within the very north of the Study Area, and Dunglass along the boundary of East Lothian and the Scottish Borders within the south of the Study Area.

The onshore parts of the Study Area primarily consist of fertile arable enclosed farmland located within the coastal fringe. The north-eastern, onshore edge of the Study Area comprises a coastal area of raised beaches, largely of gravel, and suggestive of isostatic uplift (i.e. rising land levels) during the Holocene period (the last 10,000 years – i.e. since the end of the Ice Age). Such landscapes are of geoarchaeological interest due to associated potential for preservation of archaeological remains and artefacts.

Further south of the coastal fringe, the land rises and a larger proportion is given over to pastoral (stock-raising) activities and woodland shelter belts. A series of watercourses drain from the Lammermuir Hills into the North Sea in a north-easterly direction.

The area is well-known for the high density of prehistoric archaeological remains, many of which are scheduled monuments (SM). These include Mesolithic-era (c. 8,000 BP) occupation remains on the raised beaches near the coast at East Barns (Canmore ID: 212799). A considerable number of identified prehistoric occupation and funerary sites, often identified from aerial photography, are located within the arable coastal fringe. These include prehistoric promontory forts, cairns, enclosures, ring ditches and palisaded enclosures. Collectively, they indicate a continuity of occupation of the Study Area predominantly from the Mesolithic through to later prehistoric (i.e. pre-Roman) periods.

Evidence for occupation in historic periods is also present, including designated (scheduled and/ or listed) castles, chapels and churches.

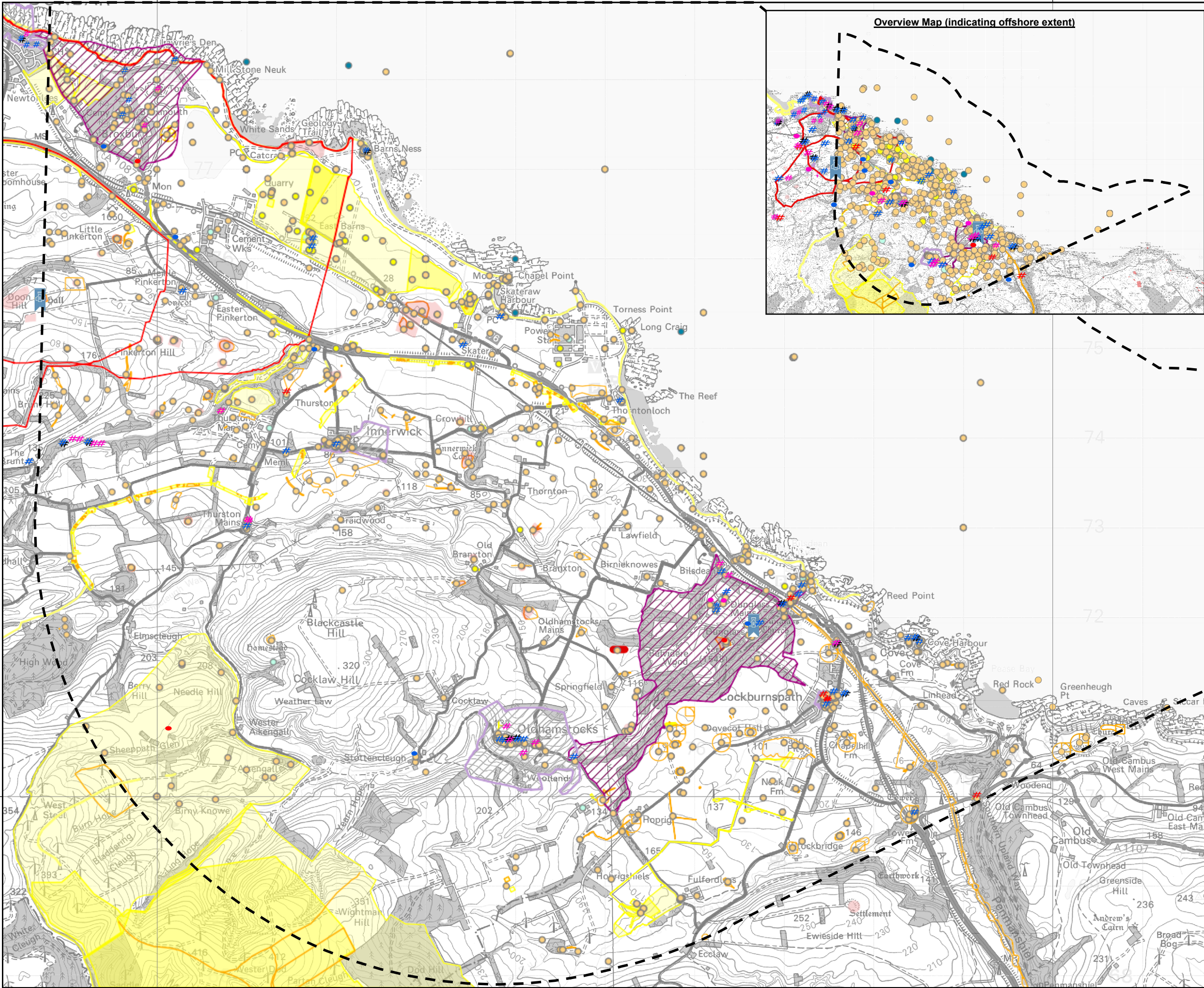
Historic environment assets found within the Study Area are shown on Figure 3.3.

3.8 Landscape Character

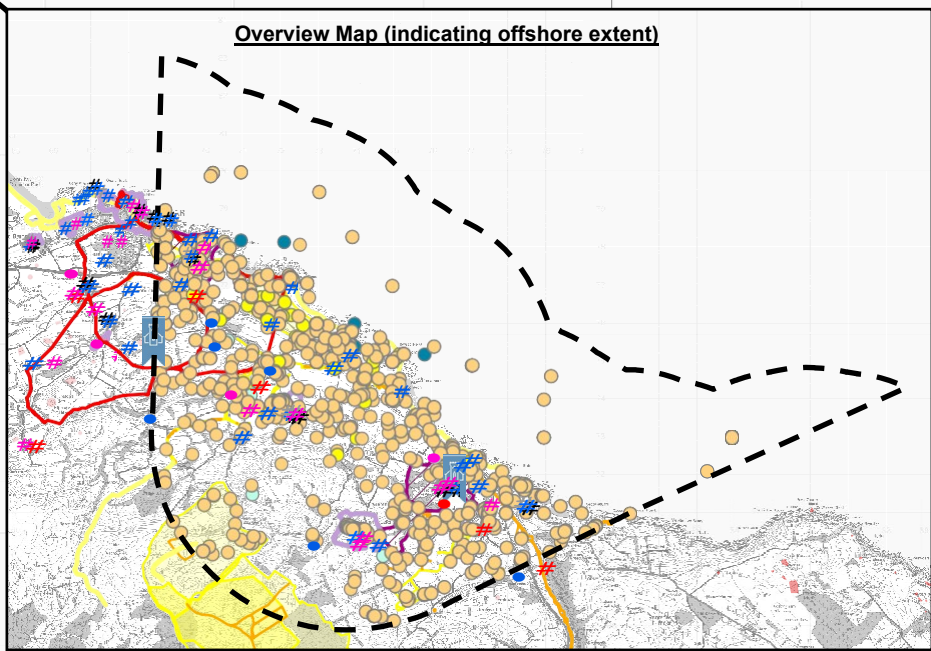
3.8.1 Landscape Designations

There are no designated landscapes of international or national importance within the Study Area.

Within the Study Area there are five separate areas classified as Special Landscape Areas (SLA), as defined in the East Lothian Local Development Plan (ELLDP) 2018 Supplementary Planning Guidance (SPG). SLA are not afforded the same degree of protection within the planning system as internationally or nationally designated landscapes, but as per Policy DC9: Special Landscape Areas of the ELLDP: *‘Development within or affecting Special Landscape Areas will only be permitted where: 1. it accords with the Statement of Importance and does not harm the special character of the area; or 2. the public benefits of the development clearly outweigh any adverse impact and the development is designed, sited and landscaped to minimise such adverse impacts.’*



Overview Map (indicating offshore extent)



Legend:

- Study Area
- Properties in care
- Listed Building Category A
- Listed Building Category B
- Listed Building Category C
- Building
- Building
- Maritime
- Event
- Event
- Event
- Monument
- Monument
- Monument
- Battlefields
- Conservation Area
- Gardens and Designed Landscapes
- Scheduled Monuments

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

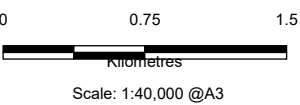


Rev	Date	Description	Drn	Chk	App
01	17/12/2020	Revised Title	DL	KB	KB
00	19/05/2020	Historic & Landscape	DL	KB	KB

Eastern Link - Torness Project



TITLE: Figure 3.3:
Historic and Landscape Designations



ELC have prepared a detailed Statement of Importance⁴ for each SLA with identified 'Special Qualities and Features' and 'Guidelines for Development.'

The SLAs within the Study Area are presented on Figure 3.8 and detailed below:

- SLA 29 Dunbar to Barns Ness Coast: Located along the coast at the north of the Study Area, this SLA covers *'a rocky shoreline and sandy beach of high scenic and sensory value with good recreation value'*.
- SLA 7 Doonhill to Chesters: Located within the west of the Study Area, located to the west of cement works and landfill, this SLA is scenic and is *'at the entry point to the Scottish Lowlands from the south, providing the backdrop to East Lothian, with good views over East Lothian and beyond, containing a coherent area of important prehistoric settlement'*.
- SLA 30 Thorntonloch to Dunglass Coast: Located along the coast directly south of SLA29 within the centre of the Study Area, this SLA *'dramatic coastal scenery and coastal agricultural land with incised gullies. It also provides the setting for Torness Power Station.'*
- SLA 4 Monynut to Blackcastle: Located inland covering a large area within the west and centre of the Study Area, *'The area consists of highly scenic dissected Lammermuir plateau dropping off to rolling hill tops cut by steep sided wooded cleughs and wider glaciated valley landform, one of which cups the historic village of Oldhamstocks.'*
- SLA 6 Halls to Bransly Hill: Located within the western edge of the Study Area only, in between SLA 7 and SLA 4, *'A particularly good example of a landscape modified during glaciation with complex landform of steep deans and dramatic gravelly knolls contrasting with more rolling hill slopes above'*.

3.8.2 Landscape Character

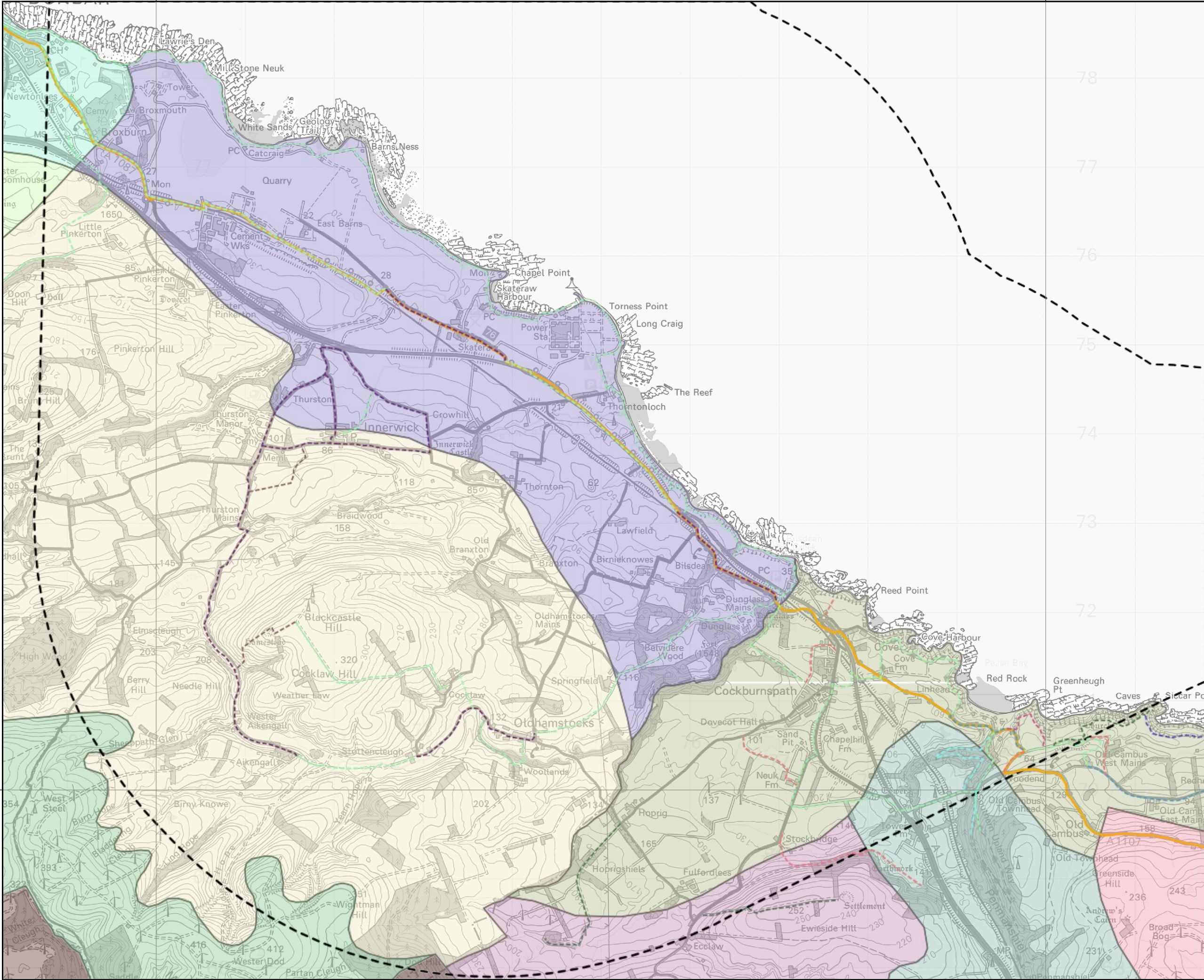
The Landscape Character of the area was classified in the Scottish Natural Heritage (SNH) July 2019 mapping of landscape character types within Scotland. The landscape is classified in terms of broad character types and areas referred to as Landscape Character Types (LCT), these are presented on Figure 3.4.

The majority of the Study Area is focused within two LCT. Along the coast the main LCT is *'LCT 277 Coastal Margins – Lothians'*; and inland the main LCT is *'LCT 269 Upland Fringes – Lothians'*. Further information on these two LCT is provided below.

Following the initial field survey it is considered unlikely that other LCT, which are all located within the fringes of the Study Area, would be impacted by the |Project. Therefore those LCT are listed below, but further detailed information is not provided:

- LCT 278 Coastal Terrace – Lothians
- LCT 275 Lowland Farmed Plain – Lothians
- LCT 266 Plateau Moorland – Lothians
- LCT 100 Plateau Farmland – Borders

⁴ https://www.eastlothian.gov.uk/downloads/file/27912/special_landscape_areas_spg



Legend:

- Study Area
- National Cycle Route
- Aspirational Core Path
- Core Path
- Core Path Link on Road
- Longer term aspirational path
- Permissive/Customary Path
- Promoted Path
- Proposed Core path
- Right of Way
- Suggested link on quiet road

Landscape Character Area

- Coastal Farmland - Borders
- Coastal Margins - Lothians
- Coastal Moorland - Borders
- Coastal Terrace - Lothians
- Dissected Plateau Moorland
- Lowland Farmed Plain - Lothians
- Pastoral Upland Fringe Valley
- Plateau Farmland - Borders
- Plateau Moorland - Lothians
- Upland Fringes - Lothians

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

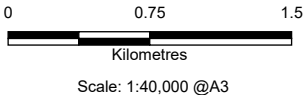


01	17/12/2020	Revised Title	DL	KB	KB
00	19/05/2020	First Draft	DL	KB	KB
Rev	Date	Description	Drn	Chk	App

Eastern Link - Torness Project



TITLE: Figure 3.4:
Landscape Character Areas and Rights
of Ways



- LCT 110 Coastal Farmland – Borders
- LCT 117 Pastoral Upland Fringe Valley.

LCT 277 Coastal Margins – Lothians

This landscape type skirts the north-eastern fringes of the Lammermuir Hills, forming a transition between the hills and the sea.

Within the July 2019 SNH assessment the key characteristics of the LCT are listed as:

- *‘Undulating agricultural hinterland of smooth convex curves;*
- *Shallow unobtrusive stream courses;*
- *Diverse coastal scenery provided by prominent rounded headlands and extensive rocky cliffs at the coast, with quiet sheltered coves containing small sand and pebble beaches backed by grassy dunes;*
- *Agricultural character with medium to large scale arable fields, contained by intermittent hedgerows and post-and-wire fences, although this has been fragmented in places to accommodate road, railway and power station development;*
- *Stone walls edge roadsides and occasional field boundaries on higher slopes;*
- *Stream courses delineated by scrub and broadleaf woodland;*
- *Scattering of traditional farms, houses and steadings served by numerous twisting minor roads;*
- *Parallel transport corridors of the A1 and rail line form significant linear features, with bridges, embankments and structures;*
- *Recreational facilities such as picnic sites, and caravan and camping sites; and*
- *Extensive views of the open sea and industrial development due to flat terrain and few woodlands’.*

It is a transitional landscape comprised of rolling lowlands, which are cut by numerous steep-sided stream valleys. As the landform approaches the coast it opens out into a broad open plain with shallower stream courses. Within the Study Area the beaches are small and backed by sand dunes, which often screen views inland.

Medium to large-scale arable fields dominate the landscape, although there are prominent industrial intrusions such as the Torness Nuclear Power Station and the large cement works and quarrying operations. Away from the stream courses there is little in the way of tree cover or mature vegetation, although new planting has been introduced around the cement works and neighbouring landfill site.

LCT 269 Upland Fringes – Lothians

LCT269 is a transitional landscape, which is not on the true uplands and is differentiated from them by more productive land cover types including improved grassland together with arable land.

Within the July 2019 SNH assessment the key characteristics of the LCT are listed as:

- *'Broadly undulating, landforms forming a series of smooth rounded hills and slopes, some steep-sided and some gently sloping, shelving gradually from the Uplands northward to merge with rolling farmlands;*
- *Occasional hills where underlying geology incorporates harder strata;*
- *Varied scale, openness and land use reflecting transitional nature between upland and lowland;*
- *Incised watercourses have etched v-shaped valleys into the slopes, often forming deep cleughs;*
- *Occasional larger rivers flow through similar, but larger-scale, v-shaped channels;*
- *Remnant heather moorland and rough grassland on high ground gives way to improved grassland and then to arable land on the lowest elevations, with a parallel transition from post and wire fence and walls to beech and hawthorn hedges;*
- *Some areas of extensive coniferous forest, but tree cover is more frequent in the form of shelterbelts;*
- *Deciduous woodland is restricted to steeper land in river channels, though this includes some important ancient woodlands;*
- *Dispersed settlement pattern of farmsteads and clusters of cottages, with occasional small villages;*
- *Distinctive character of rural road network, dense in places, including local features such as fords and bridges;*
- *Quarries, overhead lines and busy A roads which have localised influence in some parts of the landscape;*
- *Clearly transitional landscape between lowland and upland characters; and*
- *Views across the lowland, and to the coast in the east, backed by the ridge lines of the hills to the south'.*

Within the west of the Study Area is the summit of Cocklaw Hill (319m) and there is a strongly moulded landform in this area, which is composed of an intricately interwoven series of smooth, rounded low hills and slopes, dissected by an abundance of streams. The watercourses pass through deeply incised steep-sided valleys ('cleughs' or 'deans'), their winding routes often edged by craggy rock outcrops and exposed slopes.

The predominant landcover on the hill slopes comprises improved grassland, remnant heather moorland and rough grassland, interspersed with small patches of forestry on the upper slopes.

These landscapes have a transitional character between the uplands to the south and the lower lying landscapes to the north, which is apparent in the contrasting landform and land cover. The predominantly open aspect of the gentle terrain affords wide views of the surroundings, with panoramic coastal views possible from the Eastern Lammermuirs.

3.9 Visual Characteristics

The visual envelope of the Study Area is heavily influenced by the transitional nature of the landscape from the inland hill slopes to the low lying and more level landscape of the coastal fringe. From much of the Study Area there are sweeping panoramic views of the coastline, and from the landform away from the immediate coastline there are views inland towards the rising ground, with Cocklaw Hill particularly prominent in the view. One exception is from the coastline itself where views are sometimes limited to the seascape and coastline itself, with views inland often screened by dunes in the foreground. In addition, the undulating nature of the transitional landform results in small pockets of landscape where middle-to-long distance views are not possible.

Torness Nuclear Power Station and the large cement works are prominent features within views towards the coastline and views north towards Dunbar.

Woodland is sparse within the Study Area and exists mainly in conjunction with the narrow stream valleys. The largest area of woodland is around Dunglass and Bilsdean Burns, towards the south of the Study Area, and this woodland does filter views north towards the existing industrial structures for receptors within the south of the Study Area. In addition, mature woodland belts around Thurston Manor (Dry Burn) and Broxmouth Park (Brox Burn) filter views both out from, and in to, these locations.

3.9.1 Visual Sensitivity

Settlements

The town of Dunbar is located just outside the Study Area; therefore, the largest settlements are the villages of Innerwick, Oldhamstocks and Cockburnspath.

Cockburnspath is a village in the Scottish Borders within the south of the Study Area. It lies at the eastern end of the Southern Uplands and is the start/ finishing point of the Southern Upland Way. The A1 runs through the eastern edge of the village. Views north from the village are screened by rising ground immediately to the north of the village and the mature woodland belt around Dunglass Burn. There would be no impacts on the landscape or visual amenity of the village unless the Project was sited within the very south of the Study Area and within the immediate vicinity of the village.

Oldhamstocks is a small village approximately 3km west of Cockburnspath within East Lothian, it is entirely within Oldhamstocks Conservation Area. The village is on lower lying ground around Oldhamstocks Burn and enclosed by higher ground to the immediate north and south. In addition, the village is at the western end of the burns and woodland connected to Dunglass Burn and this woodland provides an additional visual filter both to and from the village. There are unlikely to be impacts on the landscape or visual amenity of the village unless the Project was sited in its immediate vicinity.

Innerwick is within the centre of the Study Area approximately 5.5km south of the southern extents of Dunbar and the majority of the village is located within Innerwick Conservation Area. The village is located on the transitional landscape between the uplands and the coast, and although not on the highest ground it is visible from much of the landscape to the east of the village. In addition, panoramic views of the lower lying ground and coastline are possible, except for where adjacent built form or trees immediately screen a view, from the village. Any large-scale built form within the landscape from Dunbar in the north towards Dunglass in the south is likely to be visible

from the village and impact views towards the coastline. The existing power station, landfill site and cement works are all prominent in views from the village.

Transport Routes

Road users within the Study Area would normally be considered to have a low susceptibility and sensitivity to the Project. However, the A1 provides a connection route for many tourists and as such the users of this road may be considered to have a medium sensitivity to the Project. Due to the length and location of the A1 from north-to-south within the Study Area, it is likely that the Project would be visible for users of the A1 for at least some section of their journey.

Tourism and Recreation

There are a small number of caravan sites within the Study Area and the sensitivity of the visitors to these sites would be considered high, although it is acknowledged that existing views from these sites already include Torness Nuclear Power Station and/ or the nearby cement works. The majority of the caravan sites are located adjacent to the coast and the view inland is often screened by landform and/ or vegetation in the foreground view.

The largest site within the Study Area is Thurston Manor Leisure Park, located between 2-4km inland and to the west of the village of Innerwick. The site is located on lower lying ground around Dry Burn and is enclosed by natural woodland along the burn, in addition to further woodland planting which has specifically been planted to help enclose and screen the site.

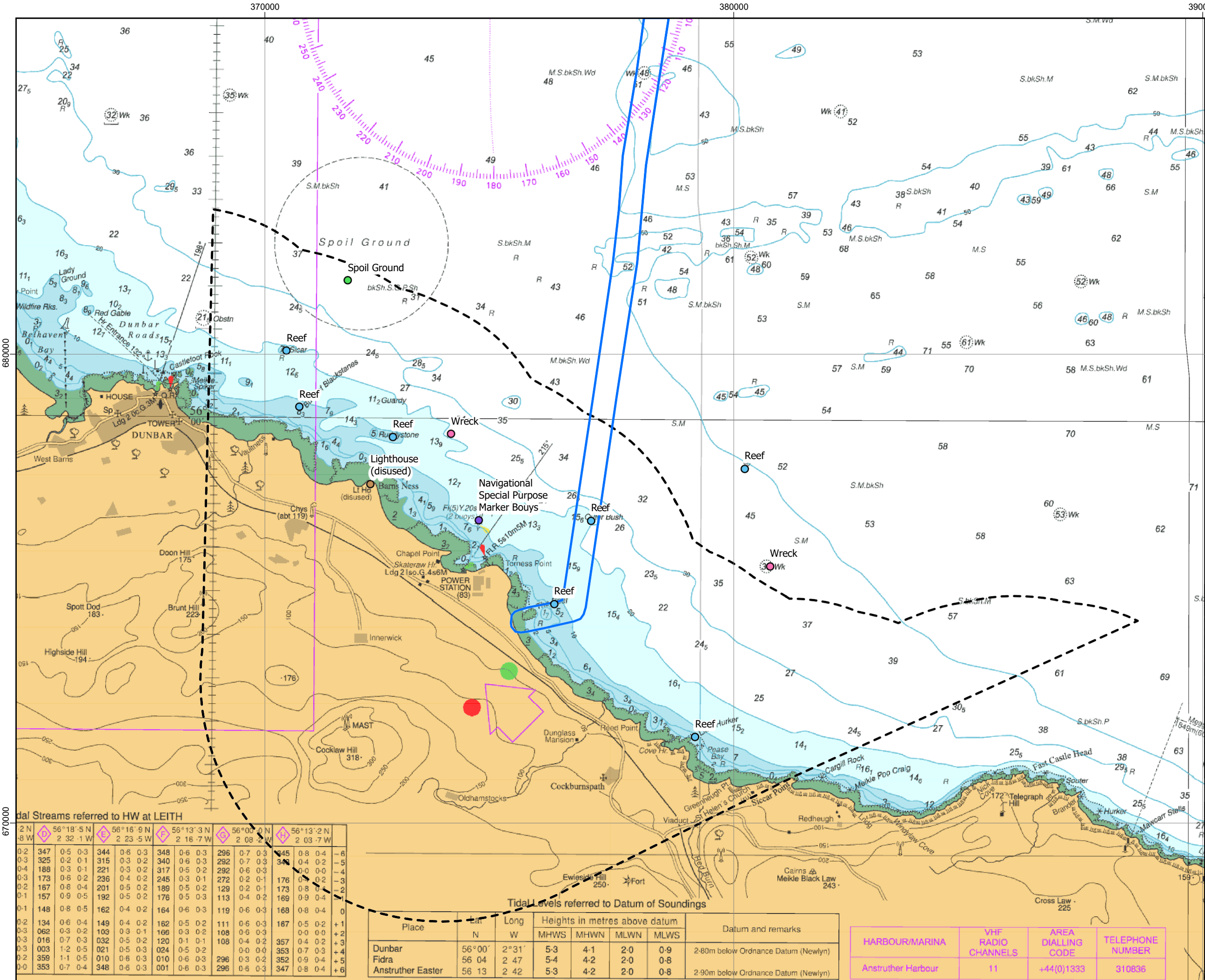
Dunbar Golf Club is a links course situated within the very north of the Study Area. Views inland would generally be screened by woodland adjacent to the golf course and around Broxmouth Park. However, there are views along the coastline from the course and potentially wider visibility of the surrounding landscape at the southern end of the course adjacent to White Sands beach. Users of the golf course would normally be considered to have a low sensitivity to development. However, the attractive location of the course and the scale of the Project would likely increase the susceptibility of the users of Dunbar golf course to the Project to medium.

Within the Study Area there are a number of core paths and access routes. Of particular relevance are the coastal paths and the core paths which connect Innerwick to Oldhamstocks to Cockburnspath, via Cocklaw Hill. The coastal path between Dunbar and Cockburnspath has been named the 'John Muir Link' and links The John Muir Way to the Southern Uplands Way. In addition, National Cycle Route 76 runs adjacent to the coastline from north to south through the Study Area. Users of these core paths and cycle routes are likely to have a medium or high sensitivity to the Project.

3.10 Ecology and Nature Conservation

3.10.1 Designated Coastal Sites

Several designated sites exist along the coastline and in the nearshore area. Onshore constraints are shown in Figure 3.5 and nearshore constraints are shown in Figure 3.6. The constraints are described below:



- Legend:**
- Study Area
 - Consented Neart na Gaoithe Offshore Wind Farm Export Cable Corridor
 - Lighthouse (disused)
 - Navigational Special Purpose Marker Bouys
 - Reef
 - Spoil Ground
 - Wreck

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

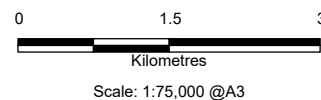


Rev	Date	Description	Drn	Chk	App
01	17/12/2020	Legend amended	DL	KB	KB
00	19/05/2020	Marine	DL	KB	KB

Eastern Link - Tor Ness Project



TITLE: Figure 3.6:
Nearshore Constraints



Barns Ness Coast Site of Special Scientific Interest (SSSI) and Geological Conservation Review (GCR) site

Barns Ness Coast Site of Special Scientific Interest (SSSI) and Geological Conservation Review (GCR) site is situated in the northern part of the Study Area and extends approximately 1km from Dunbar and covers the coastline to Skateraw Harbour / Torness Nuclear Power Station. The SSSI contains a variety of coastal habitats including shingle and sandy shores, saltmarsh, rocky stacks and sand dunes. There is a diverse range of wildflowers present in the dune grassland and the site supports several locally rare plant species and a diverse range of invertebrates and birds.

SSSIs are designated in Scotland under the Nature Conservation (Scotland) Act 2004 . The GCR underpins the designation of earth science features in SSSIs and GCR sites have statutory protection through designation as notified features in SSSIs. . Important features within the Barns Ness Coast SSSI include:

- Lower Carboniferous limestone rich in fossils (favourable condition recorded in 2002 monitoring);
- Saltmarsh habitat (favourable declining condition in 2016 monitoring);
- Sand dunes and mineral rich dune grassland habitat (unfavourable recovering condition in 2016 monitoring); and
- Shingle habitat (favourable recovered condition in 2016).

The habitats specified above are all uncommon for the East Lothian region and support a variety of locally rare and nationally important species, thus are of considerable ecological importance. Wild flowers present include purple milk-vetch (*Astragalus danicus*), restharrow (*Ononis repens*), red and white campion (*Silene dioica* and *S.latifolia*). Other locally rare plant species include sea milkwort (*Glaux maritima*), saltmarsh rush (*Juncus gerardii*), crested hair-grass (*Koeleria macrantha*), yellow horned-poppy (*Glaucium flavum*), sea arrow-grass (*Triglochin maritimum*), sea meadow-grass (*Puccinellia maritimum*) and sedges – sand sedge (*Carex arenaria*), distant sedge (*Carex distans*) and long-bracted sedge (*Carex extensa*). A high diversity of birds, butterflies, moths and invertebrates are also present (Scottish Natural Heritage, 2019). Barns Ness Coast is designated as a geological SSSI and geological conservation review site (GCR) for its important Lower Carboniferous stratigraphy (Whitbread et al., 2014a).

Pease Bay Coast SSSI and GCR

Pease Bay Coast SSSI lies at the southern end of the Study Area, to the south of Bilsdean Creek and extends for c.3 km to Red Rock at Pease Bay. The site is designated for its biodiversity, maritime cliff habitat, interesting stratigraphy and palaeontology. Para-maritime cliff-top grassland communities are present and of national importance (East Lothian Council, 2014). In addition, there is a small saltmarsh at Reed Point towards the middle of the SSSI which is of local importance due to it being the only area of saltmarsh in the Scottish Borders. Insect and bird species of local importance are supported at this site. The site is also of geological importance, with good examples of Upper Devonian and Lower Carboniferous rock strata. Numerous fossils of early fish have also been collected (Scottish Natural Heritage, 2019b).

Outer Firth of Forth and St Andrews Bay Complex Special Protection Area (SPA)

The Outer Firth of Forth and St Andrews Bay Complex is designated as a marine Special Protection Area (SPA). SPAs are selected to protect certain bird species in line with the European Union Council Directive 2009/147/EC on the Conservation of Wild Birds (“Birds Directive”). Together with Special Areas of Conservation (SAC) (protecting certain habitats and / or species in line with the European Union Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, “Habitats Directive”), SPAs are known as “European sites”.

The integrity of European sites is protected through legislation transposing provisions of the Birds and Habitats Directives into domestic law. In the UK, the Birds and Habitats Directives have been implemented through (amongst others) the Conservation of Habitats and Species Regulations 2017.

This 2,721 km² site is designated for its importance to over 40,000 marine birds in the non-breeding season and over 100,000 in the breeding season. The area provides wintering, breeding, roosting and feeding grounds. Wintering bird species present include the red-throated diver (*Gavia stellata*) and common eider (*Somateria mollissima*), with the largest Scottish populations within the site. Various gull species also use the site, whilst other species including the European shag (*Phalacrocorax aristotelis*), common guillemot (*Uria aalge*), razorbill (*Alca torda*) and Manx shearwater (*Puffinus puffinus*) are commonly present (JNCC, 2020). The site also supports many pelagic and demersal fish species, which are important for the protected seabirds.

Other designated coastal sites are in proximity to the Study Area, such as the Firth of Forth SSSI, SPA, GCR and Ramsar site (1 km to the east), the Isle of May Special Area of Conservation (SAC) (approximately 15 km to the north, and the River Tay SAC and the Firth of Forth SSSI, SPA, GCR and Ramsar site (approximately 60 km to the north).

Ramsar sites are of international importance under the 1971 Convention on Wetlands of International Importance (Scottish Government, 2010). The protection of Ramsar sites is achieved through their co-designation with European sites and / or SSSIs which are protected under the relevant statutory regime. Where the Ramsar interests coincide with Natura qualifying interests protected under a European site, the interests are given the same level of legal protection.

The Isle of May SAC is designated for its large breeding colony of grey seal (*Halichoerus grypus*), an Annex II protected species (JNCC, 2019a). The River Tay is designated due to its importance for Atlantic salmon (*Salmo salar*), brook lamprey (*Lampetra planeri*), otter (*Lutra lutra*), river lamprey (*Lampetra fluviatilis*), sea lamprey (*Petromyzon marinus*) (JNCC, 2019b). The Firth of Forth SSSI, Ramsar site, Special Protection Area (SPA) and GCR is designated for its important habitats of intertidal mud flat, rocky shore, saltmarsh, lagoon and sand dune, and for its stratigraphy, palaeontology and quaternary geology (Royal HaskoningDHV, 2018; Whitbread et al., 2014a). It also supports many bird species of European importance, including migratory species (Scottish Natural Heritage, 2019).

All of these designated sites are important to consider, despite their distance from the Study Area, taking account of the mobile nature of the species using the sites, such as birds, marine mammals and migratory fish.

3.10.2 Other Designated Sites

Several additional designated sites exist within the Study Area. These include the following and are shown in Figure 3.5.

Pease Bridge Glen SSSI lies on the south eastern edge of the Study Area, to the south of Pease Bay and c.2 km southeast of Cockburnspath. This site is split by the A1107 and is designated for ancient woodlands and bryophytes. There are also locally rare woodland invertebrates present including several species of beetles.

Lammermuir Deans SSSI lies on the southwestern edge of the Study Area, south of Cocklaw Hill and c.3 km west of Oldhamstocks village. This site is designated for its geomorphology as well as its biology which comprises upland mixed Ash woodland, subalpine calcareous grassland and valley fen, the latter of which supports rare liverworts, lichens and mosses. The SSSI is split into two sections, both of which fall within the Study Area. Woodhall Dean SSSI lies immediately to the west of the Study Area, c.3 km south of Spott village. This site is designated solely for its biological interest – broadleaved, mixed and Yew woodland which form the largest area of deciduous woodland in East Lothian. The habitat also supports a number of vascular plants which are rare or uncommon in the area, as well as liverworts and mosses.

St Abb's Head to Fast Castle Special Protection Area (SPA) lies just south of the Study Area, along the Berwickshire coast beyond Pease Bay, to the north of St Abb's. This site is designated for regularly supporting over 79,560 individual seabirds including Black-legged Kittiwake (*Rissa tridactyla*), Common Guillemot (*Uria aalge*), European Shag (*Phalacrocorax aristotelis*), Herring Gull (*Larus argentatus*) and Razor Bill (*Alca torda*). The St Abb's Head to Fast Castle Special Area of Conservation (SAC) covers much of the same area as the SPA, designated for its vegetated seacliffs.

In addition to the above, there are several wildlife reserves and areas of ancient woodland within and adjacent to the Study Area. The wildlife areas within the Study Area are Pease Dean, Thornton Glen, East Lammermuir Deans with Woodhall Dean immediately adjacent. Thornton Glen and Woodhall Dean are managed by the Scottish Wildlife Trust as Wildlife Reserves. There are also a number of local biodiversity sites within the Study Area including Thornton Burn and Bilsdean Coast.

3.10.3 Habitats and Species

Intertidal and nearshore areas

The coastal area of the Study Area is of importance ecologically for many species, including coastal plants, invertebrates, seabirds and marine mammals.

The intertidal habitats generally consist of mobile sand, coarse sediments and rocky shore areas. Many species are attracted to the area to forage, breed and for nursery grounds. Wading birds present include oystercatchers (*Haematopus ostralegus*), redshank (*Tringa totanus*), curlew (*Numenius arquata*) and dunlin (*Calidris alpina*) (EDF Energy, 2019). The coastal grassland, dunes and scrub habitat that generally back the beaches is habitat for plants such as sea sandwort (*Honckenya peploides*) and sea kale (*Crambe maritima*), nesting birds such as skylark (*Alauda arvensis*) and meadow pipits (*Anthus pratensis*) and butterflies in summer months (EDF Energy, 2019).

In terms of the nearshore area, seabed habitats consist of mobile sand, mud and coarse sediment (Mainstream Renewable Power, 2012). Species associated with these include

sea pen (*Virgularia mirabilis*) and polychaete (*Lagis*) species, brittlestar (*Amphiura filiformis*) and gastropod (*Turitella communis*) (Mainstream Renewable Power (2012). Epibenthic species present include the bryozoan *Flustra foliacea*, hydroid *Hydrallmania falcata*, soft coral *Alcyonium digitatum* and various crustaceans (Mainstream Renewable Power, 2019). Benthic and epibenthic community composition is influenced by the coastal exposure, the Firth of Forth to the north and west, as well as anthropogenic inputs such as previous pollution and agricultural/urban run-off (Mainstream Renewable Power, 2009).

Seabirds also use the coastal area extensively to forage, breed and as a migratory route. Surveys within the study area have identified almost 30 species, including fulmar (*Fulmaris glacialis*), sooty shearwater (*Ardenna grisea*), northern gannet (*Morus bassanus*), little gull (*Hydrocoloeus minutus*), lesser-blacked gull (*Larus fuscus*), herring gull (*Larus argentatus*), great black-backed gull (*Larus marinus*), kittiwake (*Rissa tridactyla*), Arctic tern (*Sterna paradisaea*), common guillemot (*Uria aalge*), razorbill (*Alca torda*), Atlantic puffin (*Fratercula arctica*) and little auk (*Alle alle*). The most commonly identified species were northern gannet, Atlantic puffin and common guillemot. A number of the seabirds present within the study area are from the large offshore colony at Bass Rock.

Marine mammals are often present in the nearshore area as residents, or migrants, with previous sightings records identifying harbour porpoise (*Phocoena phocoena*), minke whale (*Balaenoptera acutorostrata*), grey seal (*Halichoerus grypus*), harbour seal (*Phoca vitulina*), white-beaked dolphin (*Lagenorhynchus albirostris*) and killer whale (*Orcinus orca*) (Mainstream Renewable Power, 2012).

Fish and shellfish use the nearshore waters for feeding, shelter, spawning, breeding and migration. Pelagic fish present include herring (*Clupea harengus*), sprat (*Sprattus sprattus*) and mackerel (*Scomber scombrus*). Demersal fish include cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*), monkfish (*Lophius piscatorius*), flatfish and sandeel. Elasmobranchs include dogfish (*Scyliorhinus canicula*), tope (*Galeorhinus galeus*) and thornback ray (*Raja clavata*).

Some species, such as salmon (*Salmo salar*), sea trout (*Salmo trutta*), eel and lamprey, migrate from freshwater areas nearby such as the River Teith, River Tay and South Esk. Shellfish present in the area include crabs, lobsters, Nephrops, scallops and squid (Mainstream Renewable Power, 2012).

In terms of management of ecology, East Lothian Council has a Biodiversity Action Plan involving production of a biodiversity report and ecology management by rangers, supported by volunteers. For instance, groups have removed invasive sea buckthorn from coastal areas, due to its negative shading impact on dune wildflowers. Volunteer groups meet regularly, and activities are reported on through a 'Ranger newsletter'. Non-breeding wetland birds in the area are also monitored by volunteers through the Wetland Bird Survey, organised by the British Ornithology Trust. This survey provides vital data for wetland bird conservation (East Lothian Council, 2017).

Terrestrial areas

Large sections of the onshore Study Area comprise of agricultural land with arable farming dominating although some fields are also used for grazing livestock (predominantly sheep). There are also pockets of woodland throughout the area. The

coastal element comprises predominantly rocky shore habitats with small areas of sandy beaches. There is a large area of landfill just west of the cement works to the southeast of Dunbar and south of White Sands. Dunbar Golf Course is just south of Dunbar and lies within the Study Area, along the coast.

Dunbar North West Quarry, just southeast of Dunbar, is a working quarry which has been allowed to regenerate and contains a large body of water (Whitesands Quarry nature reserve). This has in turn provided habitat for a range of species including foraging Barn Owl (*Tyto alba*), Ringed Plover (*Charadrius hiaticula*), Roe Deer (*Capreolus capreolus*), Sand Martin (*Riparia riparia*) and Skylark (*Alauda arvensis*) as well as geese.

There are several buildings within the Study Area which could have the potential to support roosting bats and/ or Barn Owl, in addition, there are lime kilns along the coast which could also be suitable for roosting and hibernating bats. Small pockets of woodland throughout the Study Area and individual trees may also provide potential roosting features as well as providing suitable foraging and commuting habitat for bats.

There is suitable habitat for Badger (*Meles meles*) throughout the Study Area such as field margins, woodland and railway embankments. Watercourses could provide suitable habitat for Otter and Water Vole. There are several ponds within 500 m of the Study Area, as well as within the boundary, which may provide suitable breeding habitat for Great Crested Newt (*Triturus cristatus*) and suitable terrestrial habitat for this species exists including field margins, railway embankments, the quarry and woodland edges. These habitats also provide suitability for common reptile species – Adder (*Vipera berus*) Common Lizard (*Zootoca vivipara*) and Slow worm (*Anguis fragilis*).

Vegetation throughout the Study Area provides suitable habitat for nesting birds including ground nesting species such as Skylark. Wintering geese are also likely to use fields in the area as well as the regenerating quarry. The coastline and ocean are likely to provide suitable feeding and breeding habitat for coastal bird species including those found in the nearby St Abb's Head to Fast Castle SPA and Firth of Forth SPA.

3.10.4 Surveys Required

Ecological surveys of the preferred site option will be required. Surveys would be expected to include the following (it should also be noted that the preliminary ecological appraisal may highlight additional surveys not listed below):

- Preliminary ecological appraisal including an up to date background data search;
- Badger survey;
- Bat activity surveys and potentially preliminary roost assessment of any trees or structures (including Barn Owl) which may be affected;
- Habitat suitability index (HSI) surveys of waterbodies within 500 m of works areas for Great Crested Newt potentially followed by Great Crested Newt presence/absence surveys;
- Otter and Water Vole surveys of watercourses;
- Breeding and/ or wintering bird surveys; and
- Intertidal surveys.

3.11 Development and Planning

As the Study Area straddles the boundary between East Lothian Council and Scottish Borders Council, there are two sets of development plans that potentially apply to the Project. Each of Scotland's 32 councils and two national parks are required to produce a development plan. Development plans can consist of up to three parts; a Strategic Development Plan (required only for the four largest city regions), a Local Development Plan (LDP) and Supplementary Guidance. Through consultation with the Scottish Government and other stakeholders, development plans help deliver the strategy set out in the National Planning Framework and Scottish Planning Policy.

3.11.1 National Planning Framework

The current (third) National Planning Framework (NPF3) was laid before the Scottish Parliament on 23rd June 2014. As well as setting the context for development planning, it is the long term spatial expression of the Scottish Government's Economic Strategy and plans for infrastructure investment and development priorities over the next 20 to 30 years with a focus on supporting sustainable economic growth and the transition to a low carbon economy. NPF3 acknowledges that electricity grid enhancements will facilitate increased renewable electricity generation across Scotland and that strengthening the grid is essential in unlocking these resources both onshore and offshore. The classes of development considered to be national development and that fulfil this need are defined in NPF3: paragraph (2) (a) of Annex A's fourth development priority statement:

"2 – Description of Classes of Development: Development consisting of:

- a. new and/or upgraded onshore electricity transmission cabling of or in excess of 132 kilovolts, and supporting pylons*
- b. new and/or upgraded onshore sub stations directly linked to electricity transmission cabling of or in excess of 132 kilovolts."*

The Project is therefore national development within NPF3.

Cockenzie and the Forth Coast area extending to Torness is identified in NPF3 as an 'area of co-ordinated action' and considered to be a potentially important energy hub within the NPF3 strategy, helping to deliver a low carbon Scotland. NPF3 expects developers to work together to minimise impacts by combining infrastructure where possible.

The Scottish Government has commenced work on preparing the fourth NPF (NPF4) looking ahead to 2050. NPF4 will guide spatial development, set out national policies, designate national developments and reflect regional spatial priorities. NPF4 will also incorporate Scottish Planning Policy (see below). The timeframe for delivering NPF4 has recently been extended to account for the COVID-19 pandemic. An interim position statement on NPF4 to inform further early engagement, was published in November 2020. Public consultation commenced on 15th December 2020. A fuller consultation draft is anticipated to be published in autumn 2021. Subject to Parliamentary timetabling, it is anticipated that NPF4 would be approved and adopted in spring / summer 2022.

3.11.2 Scottish Planning Policy

Scottish Planning Policy (SPP) was published in June 2014 (and revised in December 2020) and is a statement of Scottish Government policy on nationally important

development and land use planning. SPP sets out national planning policies which relate to the preparation of development plans, design of development and determination of planning applications. It is intended to promote consistency in the application of policy across Scotland and explain how the outcomes for Scotland defined in NPF3 and SPP can be delivered on the ground.

A Low Carbon Place is one of the four planning outcomes supporting the vision for the planning system in Scotland and SPP notes that:

“Our spatial strategy facilitates the development of generation technologies that will help to reduce greenhouse gas emissions from the energy sector” (SPP, para 152);

“Efficient supply of low carbon and low cost heat and generation of heat and electricity from renewable energy sources are vital to reducing greenhouse gas emissions” (SPP, para 153);

“The planning system should support the development of a diverse range of electricity generation from renewable energy technologies – including the expansion of renewable energy generation capacity” (SPP, para 154); and

“Strategic development plans should support national priorities for the construction or improvement of strategic energy infrastructure, including generation, storage, transmission and distribution networks” (SPP, para 156)”.

3.11.3 South East Scotland Strategic Development Planning Authority

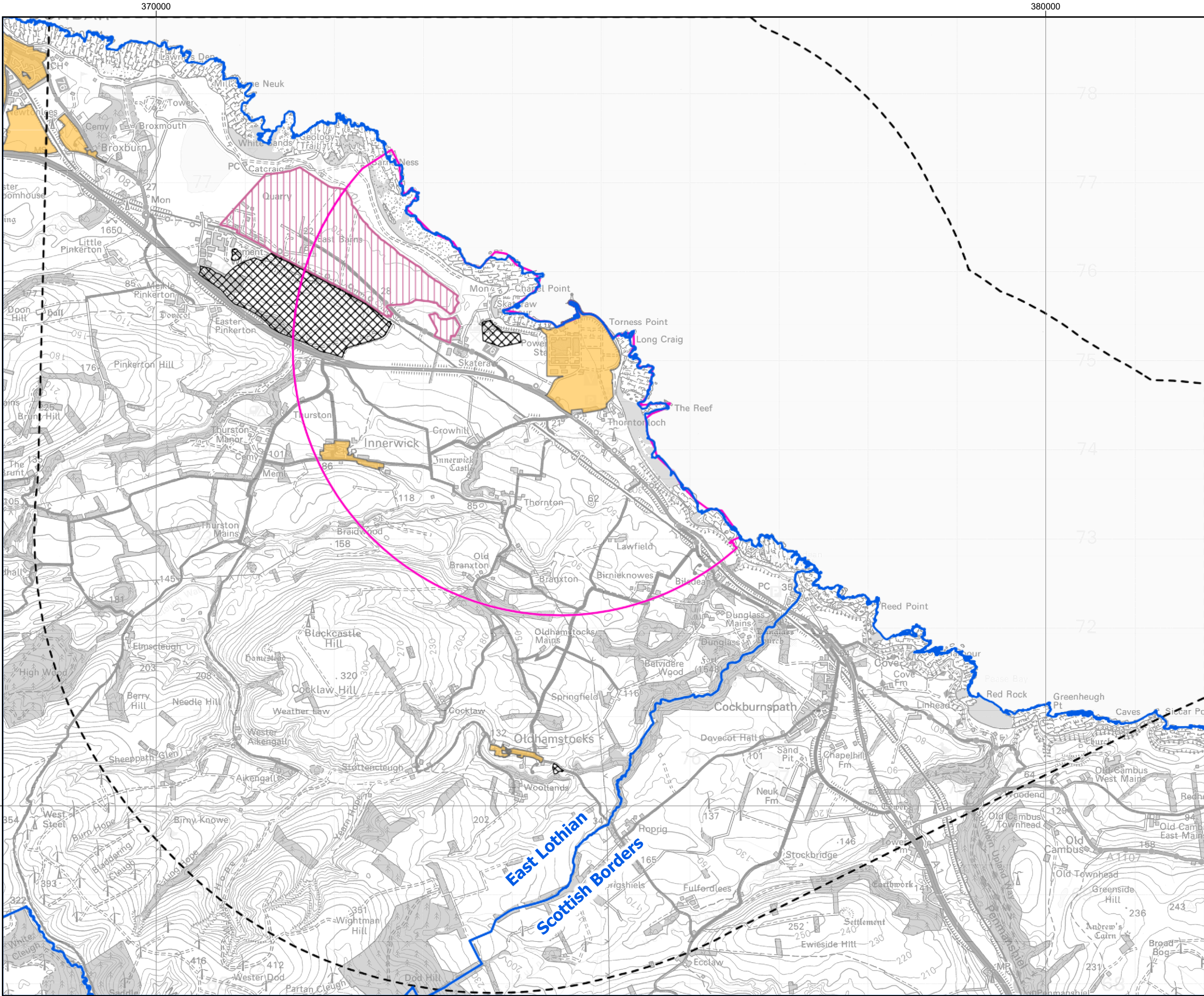
The South East Scotland Strategic Development Planning Authority (SESplan) is a partnership between six local authorities that includes both East Lothian Council and Scottish Borders Council. SESplan works collaboratively and involves engaging key stakeholders and the wider community to prepare and deliver a Strategic Development Plan to cover Edinburgh and South East Scotland. The Strategic Development Plan sets out the broad strategic planning vision, strategy and policies for the region. The current adopted SESplan Strategic Development Plan was approved by Scottish Ministers on 27th June 2013 and covers the period to 2032.

SESplan's second Proposed Strategic Development Plan was submitted to Scottish Ministers for examination on Monday 26th June 2017. On 25th March 2019, Scottish Ministers decided to reject the plan and no further comment has been made by SESplan.

3.11.4 East Lothian Council Local Development Plan 2018

The East Lothian Local Development Plan (ELLDP) is part of the Development Plan for East Lothian and was adopted on 27th September 2018. The ELLDP sets out planning strategy and policies to guide future development within East Lothian using development requirements set out in the Strategic Development Plan. The ELLDP is supported by statutory Supplementary Guidance and non-statutory Supplementary Planning Guidance, topic-based policy material too detailed for inclusion within ELLDP.

ELLDP policies that will be of particular relevance to any proposed development within the Study Area are the Torness consultation zone (Policy OI2), Forth Coast Area of Co-ordinated Action (Development Proposal PROP EGT3), Enhanced high voltage electricity transmissions networks (PROP EGT4), Development in coastal areas (Policy DC6), Protection of Mineral Reserves (Policy MIN1) and Special landscape areas (Policy DC9) (see Figures 3.7 and 3.8). These are outlined below.



- Legend:**
- Study Area
 - District Boundary
 - Torness consultation zone (OI2)
 - Minerals Safeguarding
 - MIR Strategy Site
 - Landfill Sites

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

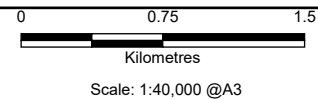


Rev	Date	Description	Drn	Chk	App
01	08/12/2020	Figure Number Amended	DL	KB	KB
00	19/05/2020	East Lothian Designations	DL	KB	KB

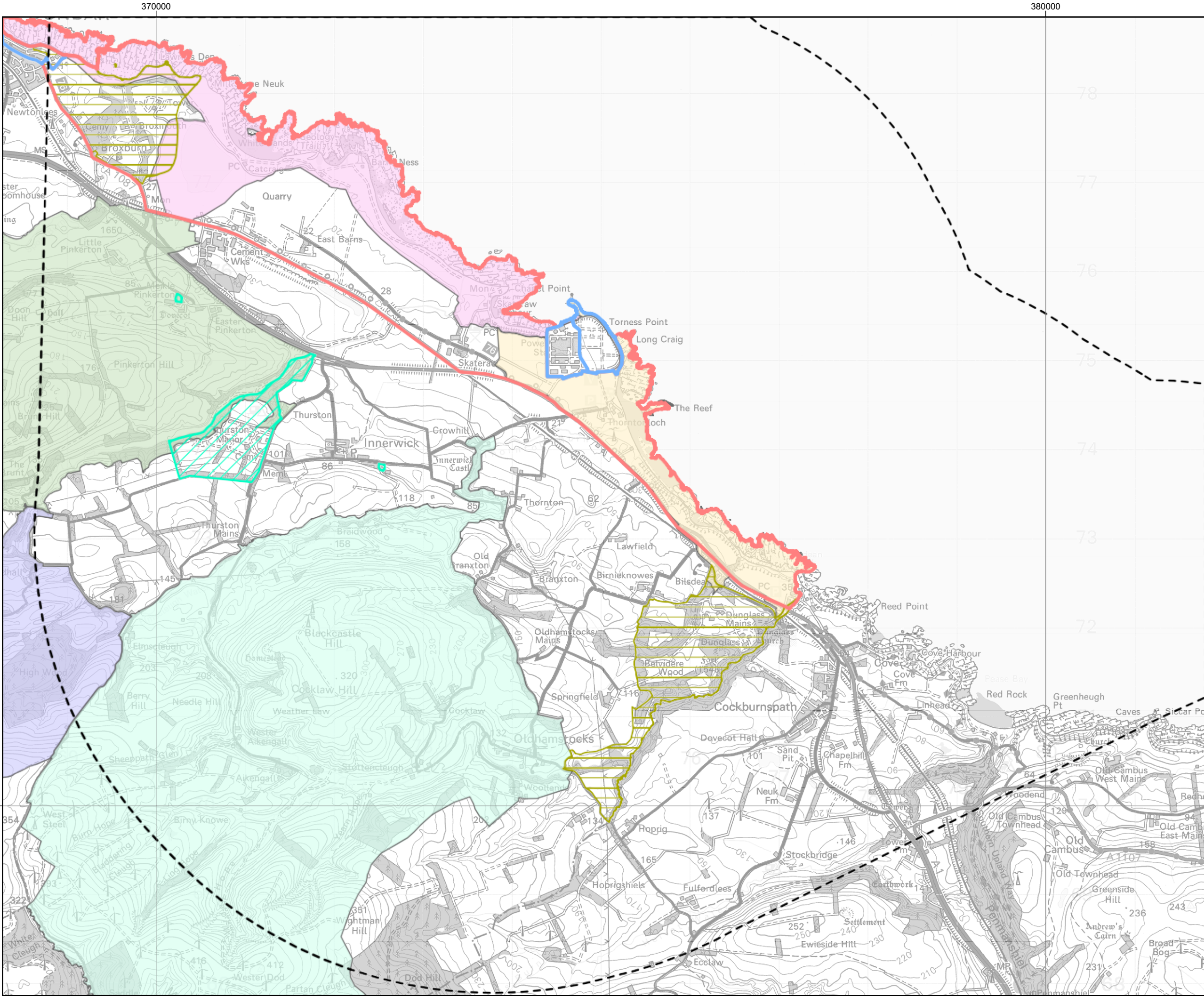
Eastern Link - Torness Project



TITLE: Figure 3.7:
East Lothian Local Plan and Historical
Landfill Data



2
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- Legend:**
- Study Area
 - Gardens and Designed Landscape
 - Local Gardens Landscapes
 - Development in coastal areas (DC6) – Constrained Coast
 - Development in coastal areas (DC6) – Developed Coast
 - Special landscape areas (DC9)**
 - 4 Monynut to Blackcastle
 - 6 Halls to Bransly Hill
 - 7 Doonhill to Chesters
 - 29 Dunbar to Barns Ness coast
 - 30 Thorntonloch to Dunglass Coast

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

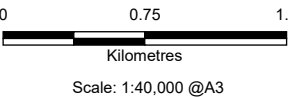


Rev	Date	Description	Drn	Chk	App
01	08/12/2020	Revised Layers	DL	KB	KB
00	19/05/2020	East Lothian Designations	DL	KB	KB

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TITLE: Figure 3.8:
East Lothian Landscape Designations



Policy OI2 places a requirement that all relevant planning applications received within a 3km radius of the Torness Nuclear Power Station will be referred to the Office Nuclear Regulation for its observations. The ELLDP notes that Torness Nuclear Power Station is expected to remain operational until at least 2030 and continues to be safeguarded for power generation. Development proposal PROP EGT2 – Torness Nuclear Power Station, which safeguards land for power generation notes that it is expected that the power station will remain operational until at least 2030.

Policy MIN1: Protection of Mineral Reserves, states that proposals for permanent development will not be permitted where this would result in the sterilisation of mineral deposits that have, or can be shown to have, a real prospect of being extracted economically (except where the development is to meet the development requirements of the Strategic Development Plan). PROP MIN2: Safeguard Oxwellmains Limestone Quarry, safeguards an area in the vicinity of the existing operational Limestone Quarry at Oxwellmains to allow for continued limestone extraction.

PROP EGT3: Forth Coast Area of Co-ordinated Action recognises that there are significant plans for offshore wind to the east of the Firths of Forth and Tay and that proposals for grid connections for these projects, requiring undersea cabling connecting with converter stations and substations, are emerging. The ELLDP states that opportunities for new grid connections in proximity to existing electricity grid infrastructure at Cockenzie and Torness should be prioritised before the use of any other location on the coast is considered. Policy EGT3 states that the Council supports the principle of electricity grid connections on the Forth coast from Cockenzie to Torness in order to facilitate off-shore energy generation, provided the following criteria are met: 1) infrastructure is combined wherever possible; 2) connection to existing infrastructure at Cockenzie and Torness is prioritised; and 3) proposals must not have an adverse effect on the integrity of the Firth of Forth SPA or any other European site either alone or in combination with other projects and plans.

Policy EGT4 places an emphasis on the Council to support enhancement of the high voltage electricity transmission network in locations defined by operational requirements, subject to acceptable impacts on the landscape, visual amenity, communities, natural and cultural heritage and the provision of appropriate mitigation where required.

Policy DC6 relates to Development in the Coastal Area, with three different types of coastal area defined: developed coast, constrained coast and unspoiled coast. The majority of the coastal area within the Study Area is designated as a constrained coast (generally undeveloped areas where new coastal development should generally be avoided) under policy DC6. There is an expectation that new development is well-related to parts of the constrained coastline where there is already some development. The area immediately to the east of Torness Nuclear Power Station and the power station site itself are defined as developed coast.

Supplementary Planning Guidance (SPG) on Countryside and Coast divides the coast into distinctive coastal areas and sets out the main qualities of each area that should be retained and if possible reinforced. Within Area 12 (Barnes Ness Coast) design/siting considerations include maintaining the openness and lack of clutter around Torness Nuclear Power Station to avoid providing visual scale comparisons in particular in views from the A1/East Coast Mainline and the coast. The SPG on Countryside and Coast also

references the Council's Shoreline Management Plan which identifies preferred management options for sections of the coastline.

There are five special landscape areas within the Study Area that are covered under policy DC9, as detailed above in Section 3.8.1. Development within or affecting Special Landscape Areas will only be permitted where: 1) it accords with the Statement of Importance and does not harm the special character of the area; or 2) the public benefits of the development clearly outweigh any adverse impact and the development is designed, sited and landscaped to minimise such adverse impacts.

Other relevant ELLDP policies relevant to the Study Area include: General Transport Impact (T2); Active Travel routes and Core Paths (T4); Construction Waste (W4); Protection of Sites of Special Scientific Interest and Geological Conservation (NH2); Protection of Local Site (NH3); European Protected Species (NH4); Biodiversity and Geodiversity interests (NH5); Protecting Soils (NH7); Trees and Development (NH8); Water Environment (NH9); Sustainable Urban Drainage Systems (NH10); Flood Risk (NH11); Air Quality (NH12); Noise (NH13); Listed Buildings (CH1); Development Conservation Areas (CH2); Scheduled Monuments and Archaeological Sites (CH4); Battlefields (CH5); Gardens and Designed Landscapes (CH6); Landscape Character (DP1); Major Development Sites (DP4) and Mineral Development Sites (MIN1). Compliance will need to be demonstrated through environmental assessment.

The ELLDP is supported by statutory Supplementary Guidance and non-statutory Supplementary Planning Guidance that is topic-based policy material too detailed for inclusion within ELLDP.

3.11.4.1 East Lothian Local Development Plan 2 (LDP2)

East Lothian Council is preparing a new Local Development Plan (LDP2) to replace the current ELLDP. It is in the early stages of preparation including information gathering, research and engaging with stakeholders.

3.11.5 Scottish Borders Council Local Development Plan

3.11.5.1 Scottish Borders Council Local Development Plan 2016 (Adopted)

The Scottish Borders Local Development Plan (SBLDP) 2016 was adopted on 12 May 2016 and addresses the future needs of the Scottish Borders community to 2025. The SBLDP sets out policy on land use and development within Scottish Borders using strategic guidance set out in the Strategic Development Plan produced by SES plan. Notable policies from the SBLDP that may be relevant to the Project include policy ED10 protection of prime quality agricultural land and carbon rich soil, and EP13 coastline.

Mapping within the SBLDP shows the majority of the Study Area within Scottish Borders as being designated as Prime Quality Agricultural Land. Policy ED10 states that development which results in the permanent loss of prime quality agricultural land should not be permitted unless: a) site is otherwise allocated within the SBLDP; b) the development meets an established need and no other site available; c) development is small scale and directly related to rural business.

As with the ELLDP, the coastline has tighter controls than other areas. Policy EP14 looks to give guidance that development proposals at a coastal location will only be permitted

where: a) the proposal is appropriate under local development policies; b) development requires a coastal location, and; c) the benefits clearly outweigh the damage to landscape character or to the nature conservation value.

Other relevant SBLDP policies relevant to the Study Area include: Sustainability (PMD1); Quality Standards (PMD2); International nature conservation sites and protected species (EP1); National Nature Conservation Sites and Protected Species (EP2); Local Biodiversity (EP3); National Scenic Areas (EP4); Special Landscape Areas (EP5); Listed Buildings (EP7); Archaeology (EP8); Conservation areas (EP9); Gardens and Designed Landscape (EP10); Protection of Greenspace (EP11); Trees, Woodlands and Hedgerows (EP13); Development Affecting the Water Environment (EP15); Air Quality (EP16); Protection of Access Routes (IS5); Flooding (IS8).

3.11.5.2 Supplementary Guidance

The SBLDP is supported by statutory Supplementary Guidance and non-statutory Supplementary Planning Guidance that is topic-based policy material too detailed for inclusion within SBLDP.

3.11.5.3 Scottish Borders Council Local Development Plan 2 (Emerging)

Scottish Borders Council are preparing a new Local Development Plan (LDP2) to replace the current SBLDP to guide future development within Scottish Borders between 2021-2026. According to the Consultation Programme set out in the Development Plan Scheme 2020, adoption of LDP2 is scheduled for Spring 2022.

3.11.6 Planning Application Search

A planning application search within the Study Area was conducted by RSK on 9th October 2019 and updated on 7th December 2020. As the Study Area lies within two local authority areas, the planning application search was conducted using the East Lothian Council and Scottish Borders Council planning portals. The planning application search was refined to only include planning applications submitted within the last five years that are outside settlement development boundaries and include:

- New builds; and
- Large scale developments (excluding minor residential or commercial alterations. e.g. extensions and conversions).

The results from the planning application search are presented in Appendix 2. Key applications include the proposed development of a new golf clubhouse, hotel and associated driving range and practice facilities at Dunbar Golf Club, the proposed development of a Plastic Recycling Facility at the Dunbar Landfill Site on land adjacent to the existing Energy Recovery Facility, and the erection of two wind turbines and associated works near to Oldhamstocks.

The consented Neart na Gaoithe (NnG) offshore wind farm includes onshore infrastructure comprising buried cables between the beach at Thorntonloch and a new substation being constructed close to the existing Crystal Rig substation owned by SP Energy Networks. The location of the NnG infrastructure has been considered as part of the engineering component of the options appraisal, in particular, the location of the landfall and marine and onshore cables.

In addition, EIA scoping requests have been submitted by SSE Renewables to Marine Scotland and East Lothian Council for the proposed Berwick Bank Offshore Wind Farm (previously known as Seagreen 2). The Berwick Bank Offshore Wind Farm will include onshore electrical infrastructure within East Lothian and will connect to the existing transmission network at Branxton. The Berwick Bank onshore works will comprise buried cables and substation infrastructure. Details of the proposed onshore works are presented in the Berwick Bank Onshore EIA Scoping Report (SSE Renewables, 2020).

SP Energy Networks and SSE Renewables are sharing relevant project information including potential locations of electrical infrastructure (cable corridors and substation options); this information was considered as part of the engineering component of the options appraisal.

4 APPRAISAL OF SITE OPTIONS

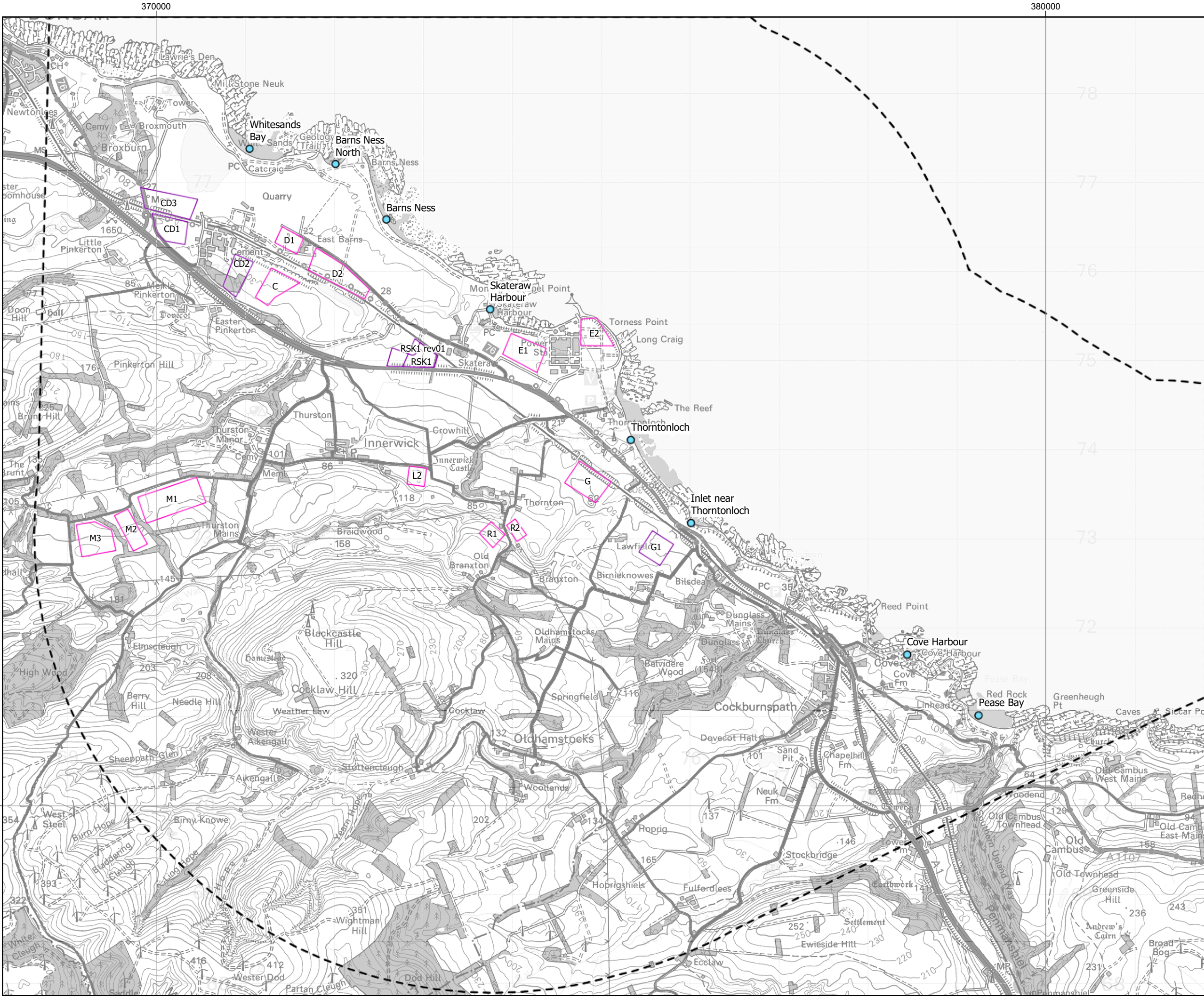
4.1 Site Options

Table 4.1 below sets out the initial site options that were considered following a review of desk-based environmental constraints data, a review of the previous Wardell Armstrong reports and RSK site visits. The site options are shown in Figure 4.1. A photo log covering each of the site options is presented in Appendix 1. Full descriptions of each landfall option can be found in Appendix 4.

Those sites considered potentially feasible following ground-truthing were taken forward for options appraisal. The initial shortlisted site options are shown in Figure 4.2.

Table 4.1: Initial Site Options

Site Option	Area (ha)	Location	Taken forward to Options Appraisal stage
Converter Station Options (4ha site required)			
C	9.7	Site is immediately adjacent to Dunbar Energy Recovery Facility (Viridor building) and working landfill site (Dunbar Landfill Site). Site of proposed Plastic Recycling Facility.	✗
D1	5.5	Land comprises Dunbar operational quarry.	✗
D2	15.5	Land immediately north of Dunbar Landfill Site.	✓
E1	12.2	Land immediately west of Torness Nuclear Power Station.	✓
E2	8.5	Land immediately east of Torness Nuclear Power Station.	✓
G	12.5	Land approximately 500m south of Thorntonloch.	✓
M1	21.8	Land approximately 500m south-west of Thurston Manor Leisure Park.	✓
M2	8	Land approximately 1km south-west of Thurston Manor Leisure Park.	✓
M3	13	Land approximately 1.5km south-west of Thurston Manor Leisure Park.	✓



- Legend:
- Study Area
 - Potential Sites
 - Wardell Armstrong Preferred Sites
 - Potential Landfall Locations

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

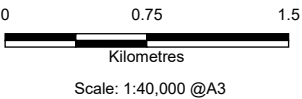


Rev	Date	Description	Drn	Chk	App
01	17/12/2020	Revised Title	DL	KB	KB
00	19/05/2020	Potential Sites	DL	KB	KB

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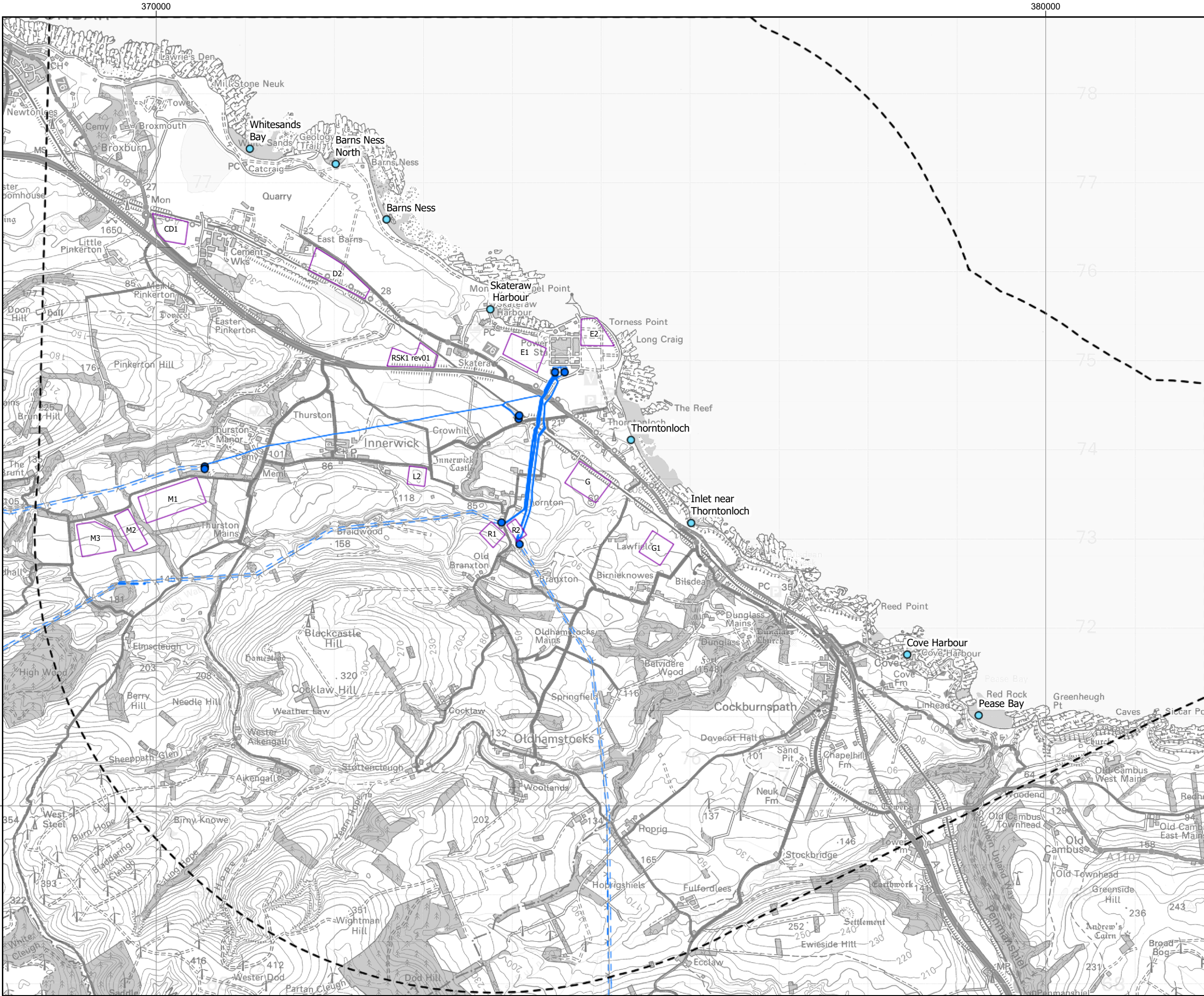


TITLE: Figure 4.1:
Initial Site Options



2

REV 01



- Legend:**
- Study Area
 - Potential Sites
 - Potential Landfall Locations
 - Transmission Substation
 - Transmission Cable
 - Transmission Overhead Lines

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

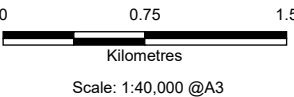


Rev	Date	Description	Drn	Chk	App
01	09/12/2020	Revised Figure Title	DL	KB	KB
00	19/05/2020	Potential Sites	DL	KB	KB

Eastern Link - Torness Project



TITLE: Figure 4.2:
Initial Shortlisted Options



Site Option	Area (ha)	Location	Taken forward to Options Appraisal stage
R2	4	Land adjacent to existing Thornton Bridge and Branxton Sealing End Compounds.	✓
CD1	9.3	Land approximately 100m west of Dunbar Cement Works.	✓
CD2	8.5	Located between Tarmac Cement Works and Dunbar Energy Recovery Facility (Viridor building) and working landfill (Dunbar Landfill Site). Limited extent of area available.	✗
CD3	13.6	Located within Whitesands Quarry Nature Reserve. Approximately 150m north-west of Dunbar Cement Works.	✗
RSK1 ⁵	7.8	Land approximately 250m south-west of Skateraw.	✓
RSK1 (Rev01)	9.8		
G1	8	Land between Throntonloch and Cockburnspath.	✓
Substation Options (2.2ha site required)			
R1	4.3	Land adjacent to existing Thornton Bridge and Branxton Sealing End Compounds.	✓
R2	2.7	Land adjacent to existing Thornton Bridge and Branxton Sealing End Compounds.	✓
L2	4.1	Land approximately 600m east of Innerwick.	✓
M2	8	Land approximately 1km south-west of Thurston Manor Leisure Park.	✓
M3	13	Land approximately 1.5km south-west of Thurston Manor Leisure Park.	✓
Landfall Options (and Site Reference)			

⁵ Note the RSK1 site boundary was refined during the assessment process to avoid overlap with a Scheduled Monument.

Site Option	Area (ha)	Location	Taken forward to Options Appraisal stage
Whitesands Bay Beach (Site 1)	N/A	Wide sandy beach with inlet, in Barns Ness Coast SSSI.	✓
Barns Ness North (Additional Site 4)	N/A	Small sandy beach north of the lighthouse at Barns Ness within Barns Ness Coast SSSI.	✓
Barns Ness (Site 2)	N/A	Small sandy beach within a rocky area and situated within Barns Ness Coast SSSI.	✓
Skateraw Harbour (Site 4)	N/A	Small sheltered bay next to Torness Nuclear Power Station within Barns Ness Coast SSSI.	✓
Thorntonloch Beach (Site 3)	N/A	Wide sandy beach outside of any protected areas.	✓
Inlet near Thorntonloch (Additional Site 1)	N/A	Small intertidal beach, backed by high cliffs.	✓
Cove Harbour (Additional Site 2)	N/A	Small harbour with a beach, backed by high cliffs within Pease Bay SSSI.	✓
Pease Bay (Additional Site 3)	N/A	Wide and sandy beach within Pease Bay SSSI.	✓

4.2 Appraisal of Site Options

4.2.1 Environmental Constraints

Each feasible converter station, substation and landfall option has been appraised against the following environmental aspects which are likely to influence the choice of a preferred location:

- Landscape and Visual;
- Ecology;
- Heritage (Historic Environment); and

- Transport and Access.

Consideration was also given to other factors including key land use issues including flood risk and contaminated land.

Other environmental aspects (e.g. local air quality) have not been assessed at this appraisal stage but will require consideration at the environmental assessment stage for the preferred option.

General consideration was also given to high-level cable route corridor constraints in order to identify and note key routing constraints associated with the above sites, and hence inform the site appraisal process. The following information was considered:

- Distance from coast (direct);
- Number of key watercourse crossings (excluding minor watercourses and drains);
- Number of road crossings;
- Number of rail crossings;
- Nearshore constraints;
- Approximate cable route lengths from R1/R2 substation; and
- Identification of any obvious pinch points.

The environmental analysis comprised a qualitative appraisal of each site option, based upon the criteria defined in Section 2.3 and professional judgement. In order to provide a common basis for assessment across several disciplines a set of criteria have been developed upon which the consideration of site options is based. Table 4.2 outlines the criteria.

Table 4.2: Appraisal Criteria

Option	Details
PREFERRED OPTION	Greatest potential to accommodate the infrastructure required within the context of the environmental constraints identified.
SOME POTENTIAL	Some potential to accommodate the infrastructure required within the context of the environmental constraints identified.
LEAST POTENTIAL	Least relative potential to accommodate the required infrastructure within the context of the environmental constraints identified.

Note that these colour coding's represent relative weightings. A green colour code does not mean that no environmental issues have been identified, nor does an orange colour indicate an insurmountable environmental constraint. The coding enables a qualitative analysis to be undertaken, applying professional judgement and experience on an aspect-by-aspect basis for each environmental feature.

As part of the appraisal process, a reconfiguration of the boundary of Site RSK1 was considered in order to minimise impacts on the nearby Scheduled Monument.

In February 2020, a number of ZTVs were prepared for the converter station site options (assuming a 30m height) to illustrate the likely maximum extent of theoretical visibility of each site option across the study area. The ZTVs are presented in Appendix 3.

Nearshore satellite imagery was obtained for the coastline between Barnes Ness North and Pease Bay and is included in Appendix 5.

A detailed analysis of site option environmental appraisal is provided in Table 4.3 (presented in Appendix 7) while a colour coded summary and assessment of the analysis undertaken by environmental specialists based on the appraisal criteria is detailed in Table 4.4. Also see Figure 4.3 and Figure 4.4.

4.2.2 Technical

In parallel with the environmental appraisal of site options, a technical review by SP Energy Networks Engineers was completed in relation to system/network design requirements. This review was undertaken to ensure that, based on the level of detail available, the site options were within the technical parameters necessary to construct the required infrastructure.

Advice on engineering constraints in the nearshore relating to potential landfall locations was provided by 4C Offshore Limited. With regard to the landfall sites, consideration was given to nearshore geology and nearshore cable crossings including proposed cable crossings associated with Neart na Gaoithe (NnG) Offshore Wind Farm and Berwick Bank cabling. At the northern landfall sites there is potential for bedrock in nearshore waters with offshore geology indicating the potential for up to 1.5nm of underlying bedrock to extend offshore. The southern landfalls also have the potential for bedrock in nearshore waters however the extent offshore is less (approx. 0.1-0.2nm). There are subtidal reefs present at the southern landfalls, however it is likely that rock does not extend subtidally across the whole bay. The proposed Neart na Gaoithe (NnG) and Berwick Bank offshore cable routes are located in the vicinity of Thorntonloch. All landfall sites north of Thorntonloch would require nearshore crossings of these cables.

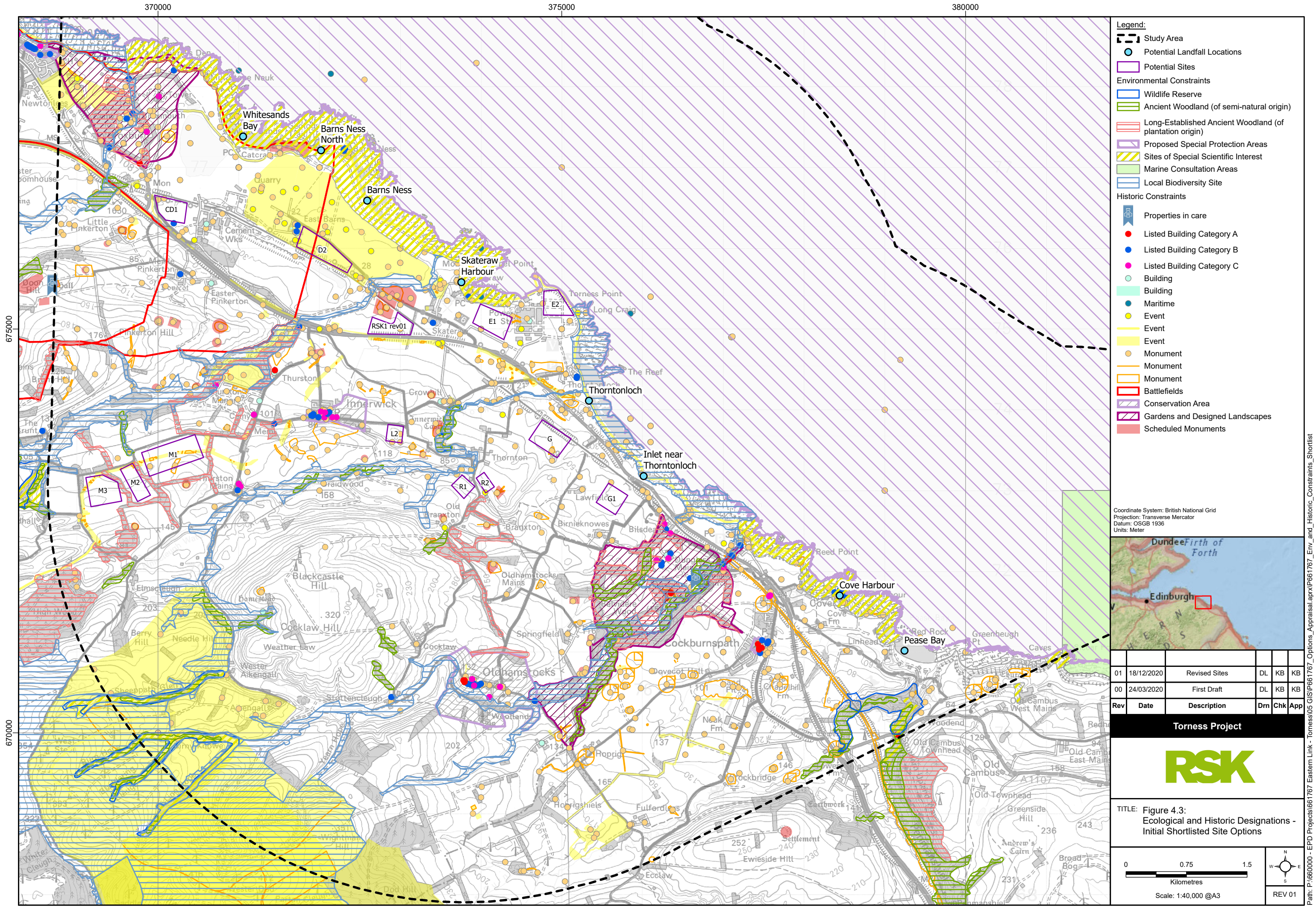
Given the technical challenges associated with the extent of bedrock in nearshore waters, particularly at the northern landfall sites, and the requirements for nearshore cable crossings around Thorntonloch, the landfall site options south of Thorntonloch, are preferred from a technical perspective. These sites have steep eroding cliffs of around 30-40m in height; it is assumed that Horizontal Direction Drill technology would be adopted at the landfall site.

The key findings of the technical appraisal have been included within Table 4.4 below.

4.2.3 Cost

It is assumed that the capital cost of establishing a converter station and a substation and at each site would be generally similar, and hence this was not considered to be a differentiator.

The main economic concerns relate to the distance of the options to both landfall and grid connection points with those sites requiring long DC and AC cable sections associated with higher cost requirements than those with shorter connections. In addition, higher costs will be associated with cable routes requiring multiple crossing of existing or proposed cables or complex crossing types. Table 4.3 (in Appendix 7) provides



- Legend:**
- Study Area
 - Potential Landfall Locations
 - Potential Sites
 - Environmental Constraints
 - Wildlife Reserve
 - Ancient Woodland (of semi-natural origin)
 - Long-Established Ancient Woodland (of plantation origin)
 - Proposed Special Protection Areas
 - Sites of Special Scientific Interest
 - Marine Consultation Areas
 - Local Biodiversity Site
 - Historic Constraints
 - Properties in care
 - Listed Building Category A
 - Listed Building Category B
 - Listed Building Category C
 - Building
 - Building
 - Maritime
 - Event
 - Event
 - Monument
 - Monument
 - Monument
 - Battlefields
 - Conservation Area
 - Gardens and Designed Landscapes
 - Scheduled Monuments

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drn	Chk	App
01	18/12/2020	Revised Sites	DL	KB	KB
00	24/03/2020	First Draft	DL	KB	KB

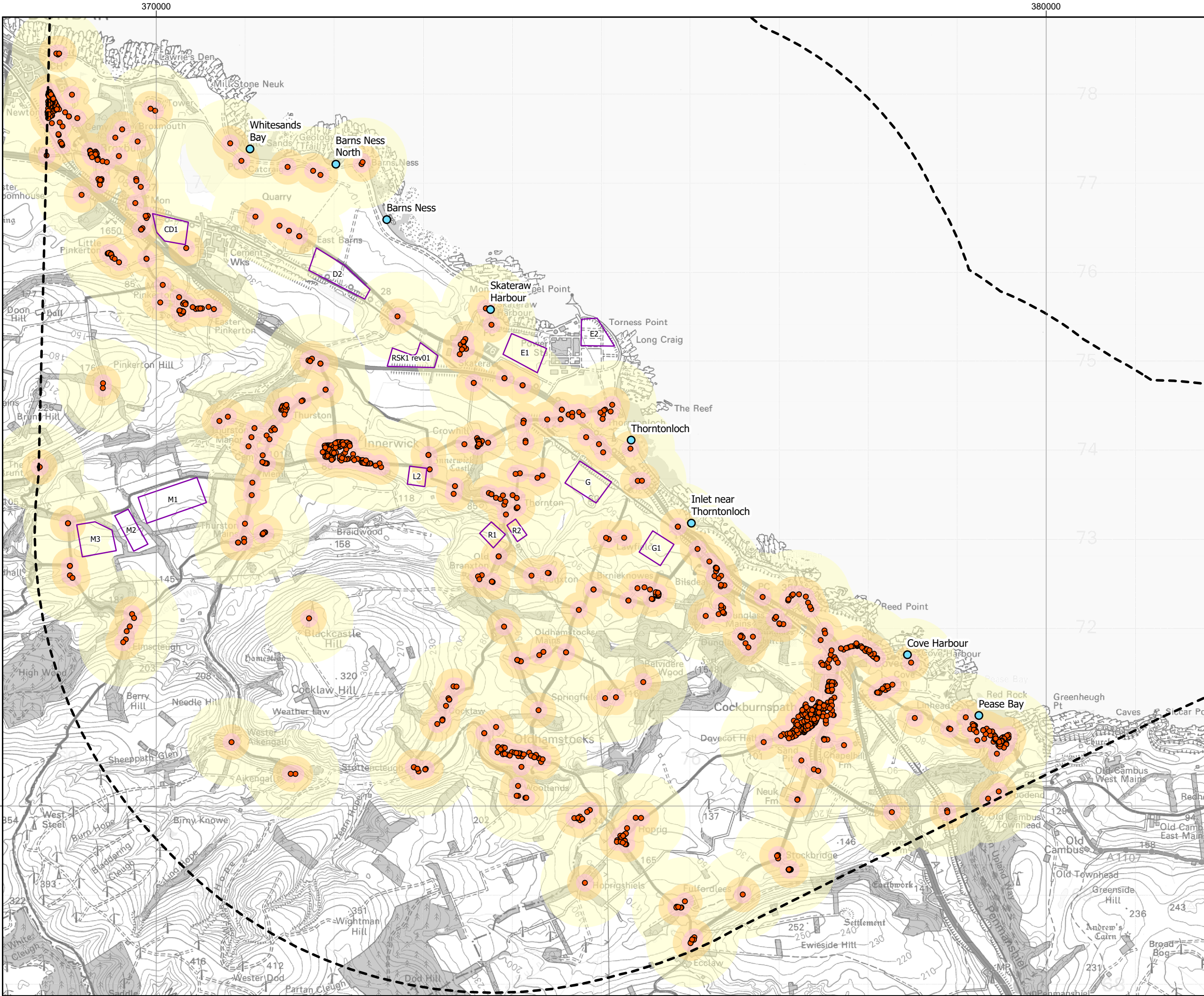
Torness Project



TITLE: Figure 4.3:
Ecological and Historic Designations -
Initial Shortlisted Site Options

0 0.75 1.5
Kilometres
Scale: 1:40,000 @A3

REV 01



- Legend:**
- Study Area
 - Potential Landfall Locations
 - Potential Sites
 - Residential Property
 - Residential Property 100m Buffer
 - Residential Property 200m Buffer
 - Residential Property 500m Buffer

(Residential Properties include the following classes: Holiday Let Accommodation, Holiday Campsite, Land, Parent Shell, Property Shell, Street Record, Residential, Dwelling, Caravan, Detached, Semi-Detached, Unclassified, Pending Internal Investigation)

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

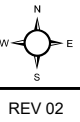
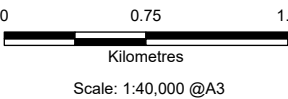


02	09/12/2020	Shortlisted Sites Added	DL	KB	KB
01	03/07/2020	Revised Properties	DL	KB	KB
00	06/03/2020	Residential Property	DL	KB	KB
Rev	Date	Description	Drn	Chk	App

Torness Project



TITLE: Figure 4.4:
Residential Property Zones



approximate distances of each site converter station option to the coast, with the closest sites being E1, E2, G, and G1, and the furthest being the M sites. This has been referenced as part of the cable corridor appraisal.

Table 4.4: Site Options - Summary of Constraints Assessment

Site	Heritage	Landscape & Visual	Ecology	Transport and Access	Land Use / Technical / Economic	Outcome
Converter Station Options						
CD1	Located within the Second Battle of Dunbar inventory battlefield (National importance). The boundary for the First Battle of Dunbar is located 100m southwest of the site. Little Pinkerton prehistoric settlement (SM5837) is located 430m southwest of the site.	Benefits from its location in close proximity to the cement works and the existing mature vegetation to the south and west. Within the eastern boundary of SLA 7 Doonhill to Chesters.	No ecological designations within the site. Site is of low value to biodiversity.	Convenient from an access perspective, due to its proximity to the A1 and the existing cement works access via a roundabout.	<p>Nearest landfall is designated as SSSI. Potential for bedrock in nearshore waters.</p> <p>Any future site extension constrained by cement works, nature reserve and A1.</p> <p>AC cable routes will require multiple crossings of existing SPT network AC cable routes (cost implications).</p> <p>Increased cable and construction costs associated with longer DC</p>	Rejected: Site is distant from preferred landfall. Potential future site extension constrained. Potential archaeological constraints including location within Battle Field Inventory.

Site	Heritage	Landscape Visual &	Ecology	Transport and Access	Land Use / Technical / Economic	Outcome
					and AC cable routes. Site is ALC Grade 3.1.	
D2	Western third of the site is within the Second Battle of Dunbar inventory battlefield. Numerous areas of archaeological significance recorded in the vicinity. The nearest designated assets are the scheduled ring ditches and cropmarks at Skateraw (SM4040) 420m east of the site, and the Dryburn Bridge enclosure and long cist cemetery (SM4038) located 450m southeast of the site	Benefits from its relative proximity to the landfill and quarry sites, however the site is relatively open.	No ecological designations within the site. Presently being used for arable farming and is of low value to biodiversity although may be used by ground nesting birds and foraging birds if stubble is left over winter.	Convenient from an access perspective, due to its proximity to the A1.	Located within a minerals safeguarding area under East Lothian Local Plan: Oxwellmains Quarry. Nearest landfall is designated as SSSI. Potential for bedrock in nearshore waters. AC cable routes will require multiple crossings of existing SPT network AC cable routes. Increased cable and construction costs associated with longer DC	Rejected: Site is within minerals safeguarding area for Oxwellmains Quarry.

Site	Heritage	Landscape Visual &	Ecology	Transport and Access	Land Use / Technical / Economic	Outcome
					and AC cable routes. Site is ALC Grade 3.1.	
E1	There are no designated or non-designated assets located within the site. The nearest designated asset is Skateraw ring ditches and cropmarks (SM4040), 790m west of the site.	Immediately adjacent to Torness Nuclear Power Station so would be viewed in the context industrial structures. However the site is exposed and would be perceptible from a wide area. Within SLA 30 Thorntonloch to Dunglass Coast.	No ecological designations within the site. Adjacent to Barns Ness Coast SSSI and the Outer Firth of Forth and St Andrews Bay Complex SPA.	Assumed access to this site could be shared with the power station.	Discussions with landowners (EDF) indicate that is unlikely that the site can be secured. EDF raise potential security and nuclear safety concerns. Records indicate the site was previously used as a quarry and landfill (construction waste). AC cable routes will require multiple crossings of existing SPT	Rejected: Potential security and nuclear safety concerns as located immediately adjacent to Torness Nuclear Power Station. Historical landfill site (inert material).

Site	Heritage	Landscape Visual &	Ecology	Transport and Access	Land Use / Technical / Economic	Outcome
					network AC cable routes.	
E2	There are no designated or non-designated assets located within the site. The nearest designated asset is Thornton Mill enclosure (SM3990), located 1.2km to the south.	Immediately adjacent to Torness Nuclear Power Station so would be viewed in the context of industrial structures. However the site is exposed and would be perceptible from a wide area.	No ecological designations within the site. Adjacent to the Outer Firth of Forth and St Andrews Bay Complex SPA.	Assumed access to this site could be shared with the power station.	Discussions with landowners (EDF) indicate that the site is within the nuclear licence area. Located within the Torness Nuclear Power Station safeguarded site as defined by East Lothian Local Plan: PROP EGT2. Site is ALC Grade 3.1.	Rejected: Site is within the Torness Nuclear Power Station nuclear licence area.
G	Single non-designated heritage asset recorded within the site; high potential for the discovery of buried archaeological	An exposed site where the introduction of a large converter building would	No ecological designations within the site. Site is of low value to biodiversity.	Access is constrained. The most direct routes require crossing the East Coast	Close to Thorntonloch landfalls.	Short-listed as potential preferred option

Site	Heritage	Landscape Visual &	Ecology	Transport and Access	Land Use / Technical / Economic	Outcome
	remains. The nearest designated asset is Thornton Mill enclosure (SM3990), located 280m west of the site.	noticeably alter the landscape. However, there are only a small number of visual receptors that would be affected.		Main Line. Each of the junctions are sub-standard, suitable for low flows and local access only. Crossing the railway underneath is height restricted. Bridges over the railway are restricted in road alignment and width/weight.	Shorter DC and AC cable routes mean lower cable and construction costs. Site size restricted due to potential Berwick Bank OWF infrastructure. Site is ALC Grade 3.1.	
G1	No designated assets within the site. Aerial photography suggests that cropmarks extend into the site; high potential for the discovery of buried archaeological remains. The nearest designated asset is the inventory garden and designed landscape of Dunglass	An exposed site where the introduction of a large converter building would noticeably alter the landscape. The land is relatively level with a gradual rise to the south-west, which would result in large-scale development	No ecological designations within the site. Site is of low value to biodiversity.	Access is constrained. The eastern route has some potential as the road is of a good standard, although the junction onto the A1 is restricted such that HGVs can only turn	Close to Thorntonloch landfalls. Shorter DC and AC cable routes mean lower cable and construction costs. Site is ALC Grade 2.	Rejected: Exposed site which is more exposed than G (which has the benefit of a higher ridge of land rising up to its immediate west), it is also closer to residential receptors, the A1,

Site	Heritage	Landscape Visual &	Ecology	Transport and Access	Land Use / Technical / Economic	Outcome
	(GDL00154), located 370m south of the site.	here being visually prominent.		in/out from the north.		the coastal path and a historic garden and designed landscape.
M1	No designated assets within the site. The density of cropmarked features and known geophysical anomalies suggests a high potential for buried archaeological remains. The nearest designated assets Woodhall Farm enclosure (SM5930), located 300m southeast of the site, and Thurston Mains enclosure and roundhouse and ring ditch (SM5845) located 410m east of the site.	Well screened from visual receptors however the size of the site creates the impression of this being an open landscape.	No ecological designations within the site. There is long-established woodland (of plantation origin) surrounding the site and a water body situated between M1 and M2; these areas would not be directly impacted.	Access via Innerwick Junction on the A1, which is a priority junction with right turning lane and reasonable geometry. Local to the site, the rural road is only single carriageway, although provides a two-way section at its eastern end.	Proposed NnG onshore cable crosses the site. Increased cable and construction costs associated with longer DC and AC cable routes. Site is ALC Grade 3.1.	Short-listed as potential preferred option
M2	No designated assets within the site. Results of the previous geophysical survey suggests a high potential for the discovery	Site is well screened from visual receptors. Good existing screening from a tree belt	No ecological designations within the site. There is long-established woodland (of	Access via Innerwick Junction on the A1, which is a priority junction	Site has High/Medium Flood Risk from Surface Water.	Short-listed as potential preferred option

Site	Heritage	Landscape Visual &	Ecology	Transport and Access	Land Use / Technical / Economic	Outcome
	of buried archaeological remains. The nearest designated asset is Woodhall Farm enclosure (SM5930), located 310m south-southeast of the site.	around the site, with the potential for further mitigation planting.	plantation origin) surrounding the site and a water body situated between M1 and M2; these areas would not be directly impacted.	with right turning lane and reasonable geometry. Local to the site, the rural road is only single carriageway, although provides a two-way section at its eastern end.	Proposed NnG onshore cable runs parallel to the northern boundary of the site. Increased cable and construction costs associated with longer DC and AC cable routes. Site is ALC Grade 3.1.	
M3	No designated assets within the site. Results of the previous geophysical survey suggests a high potential for the discovery of buried archaeological remains. The nearest designated asset is Woodhall Farm enclosure (SM5930), located 310m south-southeast of the site.	Site is well screened from visual receptors. Good existing screening from a tree belt around the site, with the potential for further mitigation planting.	No ecological designations within the site. There is long-established woodland (of plantation origin) surrounding the site and a water body situated between M1 and M2; these areas would not be directly impacted.	Access via Innerwick Junction on the A1, which is a priority junction with right turning lane and reasonable geometry. Local to the site, the rural road is only single	Proposed NnG onshore cable crosses the north west corner of the site. Increased cable and construction costs associated with longer DC and AC cable routes.	Short-listed as potential preferred option

Site	Heritage	Landscape Visual &	Ecology	Transport and Access	Land Use / Technical / Economic	Outcome
				carriageway, although provides a two-way section at its eastern end.	Site is ALC Grade 3.1.	
RSK1 (Rev01)	No designated or non-designated assets located within the site. Potential for the discovery of buried archaeological remains within the site is high. The nearest designated assets are Dryburn Bridge enclosure (SM4038) 50m to the northwest of the site and Skateraw ring ditches and cropmarks (SM4040) located 120m north of the site.	Benefits from its relative proximity to the landfill, cement works and quarry sites. Also benefits by the retention of industrial development to the east of the A1. The site is partially screened.	No ecological designations within the site. Site is of low value to biodiversity.	No direct access from the A1, although it may be possible to construct an access, subject to further investigations.	Any future site extension constrained by railway line, A road and Scheduled Monuments. Residential properties adjacent to site. Nearest landfall is designated as SSSI. Potential for bedrock in nearshore waters. Site is ALC Grade 2.	Rejected: Potential future site extension is constrained.
R2	No designated or non-designated assets located within the site. Potential for the discovery of buried	Potentially a well screened location in a dip in the landscape. Given	No ecological designations within	Access is constrained. The bridge near Branxton is	Closest landfall would be	Rejected: Access for transport of converter station components

Site	Heritage	Landscape Visual &	Ecology	Transport and Access	Land Use / Technical / Economic	Outcome
	archaeological remains within the site is high. The nearest designated heritage asset is Branxton enclosure (SM5958), located 25m southeast of the site and within the same field.	the likely size of the converter station significant earthworks would be required. Converter station is likely to be visible above the surrounding landscape, with potentially significant effects on the properties between 200 and 400m north-west of the site.	the site. Site is of low value to biodiversity.	narrow and has tight bends either side. Specific routing arrangements for different types of vehicles will be required.	Thorntonloch area. Site is ALC Grade 3.1.	(large transformers) is constrained. Potentially significant visual effects. Site size also very restricted.
Shortlisted Converter Station Sites: G, M1, M2, M3						
Substation Options						
L2	Site contains records of 2 non-designated assets including the site of a Hawker Hurricane. Within the same field, located 5m south, is a former execution site (Witches Knowe). Potential for the discovery of buried	Extremely exposed site that is visible from a wide area.	No ecological designations within the site. Site is of low value to biodiversity.	Access to this site is via Innerwick Junction on the A1 to the west as rural lanes to the east are restricted by the railway and sub-standard	No sealing end compounds close to site and therefore would require new sections of overhead transmission lines to tie substation	Rejected: Extremely exposed site with likely significant visual effects. Site is located approx 400 m from existing overhead lines, therefore

Site	Heritage	Landscape Visual &	Ecology	Transport and Access	Land Use / Technical / Economic	Outcome
	archaeological remains within the site is high. The nearest designated heritage assets are Innerwick Castle, (SM5771) located 355m east of the site, and Castledene enclosure (SM5849) located 250m east-southeast of the site.			junction geometry onto the A1.	into existing network. Site is ALC Grade 3.1.	requiring new sections of overhead line to allow connection. Before the site could be considered to be suitable for infrastructure, it would be necessary to confirm if the Hurricane crash site is considered a war grave.
M2 /M3	As above for converter station option	As above for converter station option	As above for converter station option	As above for converter station option	No sealing end compounds close to site and would therefore require new sections of overhead transmission lines to tie substation into network. Site is ALC Grade 3.1.	Rejected: Site is located approx 350 m from existing overhead lines, therefore requiring new sections of overhead line to allow connection.

Site	Heritage	Landscape Visual &	Ecology	Transport and Access	Land Use / Technical / Economic	Outcome
R1	No designated or non-designated assets located within the site. Non-designated asset located 50m northwest of the site. The potential for the discovery of buried archaeological remains within the site is high. The nearest designated asset Branxton enclosure (SM5958), located 265m east of the site.	Similar to site R2, but slightly more exposed and significant earthworks would be required.	No ecological designations within the site. Site is of low value to biodiversity.	Access is constrained. The bridge near Branxton is narrow and has tight bends either side. Specific routing arrangements for different types of vehicles will be required.	Adjacent to existing transmission network. Requires minimal amendments to connect to network. Site is ALC Grade 3.1.	Short-listed as potential preferred option
R2	No designated or non-designated assets located within the site. The potential for the discovery of buried archaeological remains within the site is high. The nearest designated heritage asset is Branxton enclosure (SM5958), located 25m southeast of the site.	Potentially a well screened location in a dip in the landscape. Earthworks would be required. Substation would be viewed in conjunction with the existing adjacent sealing end compounds. Due to the landform some earthworks	No ecological designations within the site. Site is of low value to biodiversity.	As for R1 substation	Adjacent to existing transmission network. Requires minimal amendments to connect to network. Site size is restricted by existing underground transmission	Short-listed as potential preferred option

Site	Heritage	Landscape Visual & Ecology	Transport and Access	Land Use / Technical / Economic	Outcome
		impacting the landscape are likely.		cables from Torness Nuclear Power Station and proximity of Branxton sealing end compound.	
Shortlisted Substation Site: R1, R2					

Site	Heritage	Nearshore	Ecology	Access	Outcome
Landfall Options					
Whitesands Bay	The site immediately inland from the beach lies within the Second Battle of Dunbar inventory battlefield. Broxmouth Park inventory garden and designed landscape lies to the immediate west, and SM lies to the immediate southeast.	Potential for bedrock in nearshore waters; offshore geology indicate potential for up to 1.5nm of underlying bedrock to extend offshore. Cable likely to have to cross the cable of the Neart Na Goithe OWF in nearshore waters.	Located within the Barns Ness Coast SSSI. Offshore, the site also overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA. Several wading birds were observed at the site.	Would require use of an existing access road that serves a beach car park from the A1087.	Rejected: Designated as SSSI. Potential underlying bedrock offshore.

Site	Heritage	Nearshore	Ecology	Access	Outcome
Barns Ness North	Barns Ness lighthouse, (Category B listed building) present at the site. Offshore, numerous recorded losses.	Potential for bedrock in nearshore waters; offshore geology indicate potential for up to 1.5nm of underlying bedrock to extend offshore. Cable likely to have to cross the cable of the Neart Na Goithe OWF in nearshore waters.	Located within the Barns Ness Coast SSSI. Offshore, the site also overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA. Several wading birds were observed at the site.	Local access would require a haul road across a field to reach landfill. Alternatively, this option could use an existing access road that serves a beach car park from the A1087, requiring a haul road beyond the car park	Rejected: Designated as SSSI. Potential underlying bedrock offshore.
Barns Ness	Archaeological and/or cultural implications are not anticipated to be of concern.	Potential for bedrock in nearshore waters - especially at the northern and southern extents of the beach. Cable likely to have to cross the cable of the Neart Na Goithe OWF in nearshore waters.	Located within the Barns Ness Coast SSSI. Offshore, the site also overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA. Several wading birds were observed at the site during the site visit.	Local access would require a haul road across a field to reach landfill.	Rejected: Designated as SSSI. Potential underlying bedrock offshore.
Skateraw Harbour	Non-designated lime kilns and a war memorial recorded at the site. The site was also used as an airfield during the First World War. Offshore,	Potential for bedrock in nearshore waters - the nearshore waters have subtidal reefs. A route between areas of underlying offlying bedrock is possible. The	Located within the Barns Ness Coast SSSI. Offshore, the site also overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA. Several wading birds	Local access would require use of a narrow road through the village of Skateraw.	Rejected: Designated as SSSI. Potential underlying bedrock offshore.

Site	Heritage	Nearshore	Ecology	Access	Outcome
	there are several recorded losses.	cable would also be likely to have to cross the cable of the Neart Na Goithe OWF in nearshore waters. Torness Nuclear Power station to the south and existing navigation for vessels into the port to consider.	were observed at the site during the site visit.		
Thorntonloch	Archaeological and/or cultural implications are not anticipated to be of concern.	Potential for bedrock in nearshore waters - the nearshore waters have subtidal reefs, however the beach is long and it is likely that rock does not extend subtidally across the whole bay. It would be possible to avoid crossing the export cable of the Neart Na Goithe OWF in nearshore waters. Landfalls for Neart Na Goithe OWF and Berwick Bank OWF are located at Thorntonloch.	The coast is designated as Bilsdean Coast Local Biodiversity Site. Offshore, the site also overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA. Site subject to some human disturbance.	Accessed via a rural track that leads off the A1, just south of Torness Nuclear Power Station. Alternative access from the caravan park to the north may be possible, although would affect the amenity of a number of residential receptors.	Area of Thorntonloch identified as preferred option
Inlet near Thorntonloch	Archaeological and/or cultural implications are	There are high eroding cliffs of approximately 40	The coast is designated as Bilsdean Coast Local	This option is accessible via a	Area of Thorntonloch

Site	Heritage	Nearshore	Ecology	Access	Outcome
	not anticipated to be of concern.	m at this inlet, and a small strip of sandy beach at low tide. There is potential for 0.1 - 0.2 miles of bedrock/till outcrop in nearshore waters. It would be possible to avoid crossing the export cable of the Neart Na Goithe OWF and Berwick Bank OWF in nearshore waters.	Biodiversity Site and Thorntonloch Local Geodiversity Site. Offshore, the site also overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA.	small track off the A1 (which runs parallel), however only to the cliff tops. The lower beach is not currently accessible, and is covered at high tide.	identified as preferred option
Cove Harbour	The small hamlet of Cove and Cove harbour are of considerable archaeological and cultural importance.	Steep eroding cliffs of around 30-40m in height. The harbour is surrounded by considerable intertidal and subtidal bedrock and numerous offshore bedrock reefs. It would be possible to avoid crossing the export cable of the NnG OWF and Berwick Bank OWF in nearshore waters.	Located within the Pease Bay SSSI. Offshore, the site also overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA.	Not easily accessible.	Rejected: Designated as SSSI. Intertidal and subtidal bedrock and numerous offshore bedrock reefs.
Pease Bay	Onshore, there is a non-designated asset although	Steep eroding cliffs of around 30-40m in height.	Within the Pease Bay SSSI. Offshore, the site	Access via a rural road to Pease Bay	Rejected: Designated as SSSI.

Site	Heritage	Nearshore	Ecology	Access	Outcome
	the majority of the site is now a caravan park. Offshore, there are recorded losses.	Offshore bedrock reefs. It would be possible to avoid crossing the export cable of the NnG OWF and Berwick Bank OWF in nearshore waters.	also overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA. The bay is also a nature reserve, managed by the Scottish Wildlife Trust.	Leisure Park (caravan site), which has a large parking area and facilities. A tarmac area leads to the centre of the beach.	Offshore bedrock reefs.
Shortlisted Landfall Site: Thorntonloch/Inlet near Thorntonloch					

4.2.4 Shortlisted Site Options

Based on the comparative analysis (environmental, technical and cost), the following site options were excluded from further consideration:

- converter station sites: CD1, D2, E1, E2, G1, RSK1, R2
- substation sites: L2, M2, M3
- landfall sites: all sites north of Thorntonloch, Cove Harbour, Pease Bay

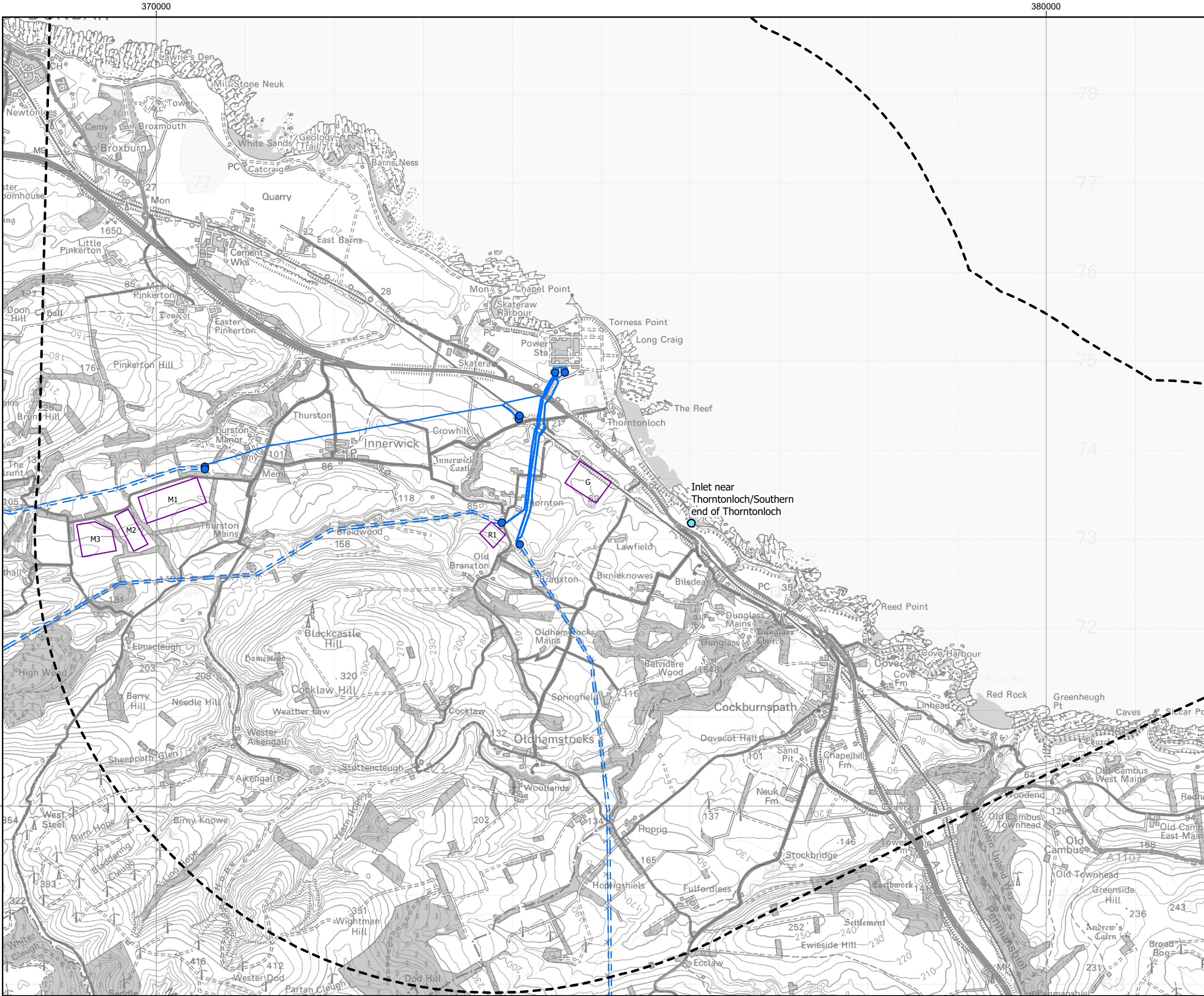
The shortlisted sites (see Figure 4.5) were identified as follows:

- converter station site: G, M1, M2, M3
- substation site: R1, R2
- landfall: Thorntonloch/Inlet near Thorntonloch

Further engineering studies focussed on the marine cable route identified a preference for the landfall at a point between the two shortlisted landfall locations. From the two shortlisted alternatives, a landfall at southern Thorntonloch was therefore identified as the preferred landfall option to be taken forward.

For the short-listed sites, potential cable corridor options from the preferred landfall at southern Thorntonloch to the converter station options (G1, M1, M2 and M3), and from converter station site options to the substation options ((R1/R2) were identified and appraised (see Section 5 below).

Following further technical consideration of the potential substation sites R1 and R2, Site R1 to the west was identified as providing a more optimal site than R2. Site R2 is restricted in size due to the existing Torness Nuclear Power Station underground cables that connect into the existing sealing end compounds at Branxton and Thornton Bridge and is not large enough to accommodate the required infrastructure. Site R1 provides the required size to facilitate the Eastern Link and to provide the connection to Berwick Bank OWF. It is also large enough to accommodate any future expansion plans. From the two shortlisted substation alternatives, Site R2 was therefore identified as the preferred substation option to be taken forward to the next stage.



- Legend:
- Study Area
 - Potential Landfall Location
 - Wardell Armstrong Preferred Sites
- Existing Infrastructure
- Transmission Substation
 - Transmission Cable
 - Transmission Overhead Lines

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

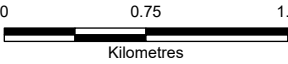


Rev	Date	Description	Drn	Chk	App
00	15/12/2020	Shortlisted Sites	DL	KB	KB

Eastern Link - Torness Project



TITLE: Figure 4.5:
Shortlisted Site Options



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5 APPRAISAL OF ROUTEING OPTIONS

5.1 Route Corridor Options

The identification of cable route corridor options was undertaken following the selection of shortlisted converter station, substation and landfall sites (RC). The corridors were based on a converter station located at the G or M sites, with a substation in the general vicinity of R1/R2, and landfall at the southern end of Thorntonloch (avoiding nearshore cable crossings of NnG Offshore Wind Farm and proposed Berwick Bank OWF cabling). The following corridor options (200m wide for appraisal purposes) were identified. Cable route corridor options to the M sites were not considered individually for each of the Sites M1, M2 and M3 at this stage; rather corridor options connecting from the general vicinity of the M sites (connecting at M1) to the general vicinity of a substation sites at R1/R2 were identified for the purpose of comparing corridor options. Given the short distance from the landfall to the G site and from the G site to R1/R2, only one DC and one AC corridor option was identified for the G site.

- DC cable corridor from landfall to G
 - G – DC RC1
- AC cable corridor from G to substation at R1/R2
 - G – AC RC1
- DC cable corridor from landfall to M sites
 - M – DC RC1
 - M - DC RC2
 - M - DC RC3 (note: follows existing underground cable which SP Energy Networks advised may require replacement)
 - M - DC RC4
 - M – DC RC5 (combined AC and DC corridor)
- AC cable corridor from M sites to substation at R1/R2
 - M – AC RC1
 - M – AC RC2
 - M – DC RC5 (combined AC and DC corridor)

Further to the identification of the above cable corridors, SP Energy Network's engineering team identified the following additional cable corridor options for consideration:

- M1 - AC Eng1
- M2 - AC Eng1
- M3 - AC Eng1

The AC Eng1 cable corridor option is common for the majority of its length but diverts to the individual M1, M2 and M3 sites at the western end.

5.2 Appraisal of Cable Corridor Options

5.2.1 Environmental Considerations

Each cable route corridor option has been appraised against the following environmental aspects which are likely to influence the choice of a preferred route:

- Landscape and Visual;
- Ecology;
- Historic Environment; and
- Transport and Access.

Factors including cable crossings (e.g. watercourses, rail and road crossings), corridor length and the position of 'pinch points' were also taken into account during corridor appraisal.

The environmental analysis comprised a qualitative appraisal of each route corridor option, based upon the criteria defined in Section 2.3 and professional judgement. The route corridor options were considered against the appraisal criteria presented in Table 4.2.

A detailed analysis of the route corridor environmental appraisal is provided in Table 5.1 (presented within Appendix 7) while a colour coded summary of the analysis undertaken by environmental specialists based on the appraisal criteria is detailed in Table 5.2. Figures 5.1 and 5.2 show the cable corridors appraised and a summary of constraints.

5.2.2 Technical and Cost Considerations

In parallel with the environmental appraisal of cable corridor options, a technical review by Cable Consulting International Ltd (CCI) was completed in relation to cable engineering constraints. This review was undertaken to evaluate the cable corridor options in terms of engineering difficulty. This included consideration of matters such as safety during both installation and operation, route distance, topographical and geological features, ground conditions including risk of contamination and ground stability, access for both the construction phase and future maintenance, crossing positions at watercourses, utility crossings (including potential impacts on cable ratings), ground suitability and elevation alignment, and flood risk. The appraisal includes consideration of the recently installed NnG onshore cables and potential cable corridors associated with Berwick Bank OWF.

The main economic concerns relate to the length of the cables, with higher cost requirements associated with longer cable connections. In addition, higher costs will be associated with cable routes requiring multiple crossing of existing or proposed cables or complex crossing types.

The engineering review identified key points of engineering difficulty associated with each corridor and allocated a difficulty rating. Based on this each route was given a weighted score. The key findings of the technical appraisal have been included within Table 5.2 below.

Table 5.2: Routeing Options - Summary of Constraints

Corridor	Approx Length	Heritage	Landscape & Visual	Ecology	Access	Technical
M – DC RC1	6.3km	Corridor contains 3 designated heritage asset and 3 non-designated assets.	The corridor crosses Ogle Burn and Dunglass Burn where tree cover is less dense, two linear belts of ancient woodland - long established plantation and several field hedgerow boundaries.	Crosses Thornton Burn and Dunglass Burn Local Biodiversity Site.	Assumes combined landfall HDD of A1 and railway. Multiple minor road crossings required. Access to the section across Cocklaw Hill / Blackcastle Hill would require a lengthy haul road.	Contains the greatest elevational change along corridor length, with sections of the cable corridor at Blackcastle Hill containing inclines with a gradient of up to approximately 20% which present substantial civil engineering challenges. Potential for shallow bedrock on slopes of Blackcastle Hill - cost implications relating to rock breaking and removal.
M – DC RC2	6.5km	Corridor contains 2 designated heritage asset and moderate density of non-designated assets; due to the density of assets it is unlikely that they can all be avoided.	The corridor crosses Thornton Burn, 2 sections of ancient woodland (long-established plantation) and several field hedgerow boundaries.	Crosses Thornton Burn and Thornton Glen SWT Reserve/Thurston Burn Valley 2 Local Biodiversity Site. Corridor passes through two areas of long-established woodland (of plantation origin).	Assumes combined landfall HDD of A1 and railway. Multiple minor road crossings required. Access to corridor from minor roads is reasonable from the A1; restrictions on vehicle size due to railway bridges on minor roads serving Lawfield and Branxton.	Crosses and runs in close proximity to key existing/proposed wind farm infrastructure (with potential to reduce current ratings (ie potential to reduce the maximum electrical current that can be carried by the cable) and railway infrastructure (with potential for exposure to earth return currents associated with the railway electrification systems and vibrational disturbance) (ie potential to reduce the maximum electrical current that can be carried by the cable).
M – DC RC3	5.9km	Corridor contains 3 designated heritage asset and several non-designated assets. If the physical footprint of the route were to follow the existing underground cable which may require replacement, impacts on previously identified and potentially previously unidentified undisturbed archaeological remains is likely to be minimal.	It would be difficult for the corridor to avoid ancient woodland to the south of the holiday lodges. It crosses Thornton Burn and another three well established field hedgerow boundaries.	Crosses Thornton Burn and Thornton Glen SWT Reserve/Thurston Burn Valley 2 Local Biodiversity Site. Corridor passes through two areas of long-established woodland (of plantation origin).	Assumes combined landfall HDD of A1 and railway. Multiple minor road crossings required. Access to corridor from minor roads is reasonable from the A1; restrictions on vehicle size due to railway bridges on minor roads serving Lawfield and Branxton.	Crosses and runs in close proximity to key existing/proposed wind farm infrastructure (with potential to reduce current ratings) (ie potential to reduce the maximum electrical current that can be carried by the cable) and railway infrastructure (with potential for exposure to earth return currents associated with the railway electrification systems and vibrational disturbance) (ie potential to reduce the maximum electrical current that can be carried by the cable).

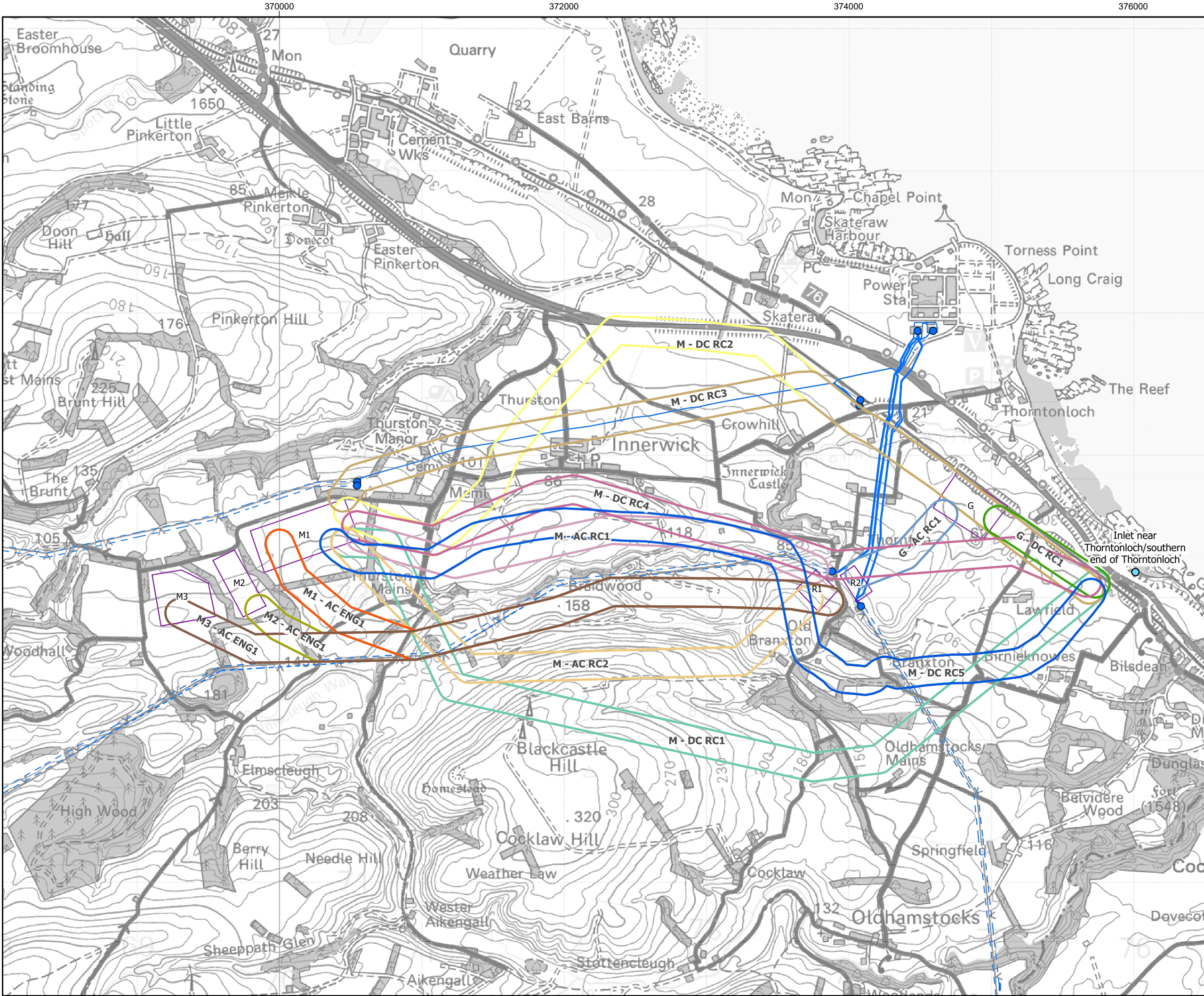
Corridor	Approx Length	Heritage	Landscape & Visual	Ecology	Access	Technical
M – DC RC4	5.4km	Corridor contains 3 designated heritage assets and high density of non-designated assets; due to the density of assets it is unlikely that they can all be avoided.	The corridor crosses Thornton Burn, two small mature woodland belts (inc. one which long-established woodland (of plantation origin), up to 17 field hedgerow boundaries and a 300m area of a locally designated SLA.	Crosses Thornton Burn and Dunglass Local Biodiversity Site.	Assumes combined landfall HDD of A1 and railway. Multiple minor road crossings required. Access to corridor from minor roads is reasonable from the A1; restrictions on vehicle size due to railway bridges on minor roads serving Lawfield and Branxton.	Shortest of M DC routes and least elevational change. However, some sections of elevational change are present to the south of Thornton at Thornton Burn and south of Innerwick; this could potentially require sections of the cable route to be cut and filled which would represent a significant civil engineering challenge. Thornton Burn is set within a deep wooded cleugh (ravine) that may require a cable bridge crossing where an HDD would be limited by depth.
M – DC RC5	7.2km	Corridor contains 4 designated heritage assets and a high density of non-designated heritage assets, particularly at the western end; due to the density and extent of the identified assets, it may not be possible to avoid them all.	The corridor crosses Ogle Burn, two linear belts of ancient woodland (long established plantation), and several field hedgerow boundaries.	The corridor crosses Thornton Burn watercourse, and Dunglass Burn Local Biodiversity Site as well as crossing mainly grassland and arable fields.	Crosses several minor roads serving local villages such as Lawfield and Branxton. Minor roads at eastern section are restricted in height and size of vehicle. Access to location is generally reasonable from A1.	Follows, but does not cross, existing/proposed wind farm circuits; potential to utilise pre-existing cable swathes where possible. Contains several sections of elevational change including southwest of Innerwick. Crossing of Thornton Burn required by HDD or cable bridge as burn is within deep cleugh.
M – AC RC1	3.3km	Corridor contains 2 designated heritage assets and numerous non-designated assets. The corridor contains more designated assets than RC2.	The corridor crosses a section of Dunglass Burn with tree cover, 1 linear belt of ancient woodland (long established plantation) and 3 field hedgerow boundaries.	Crosses Thornton Burn and Dunglass Local Biodiversity Site.	1 minor road crossing required. Access is generally reasonable from the A1 with some restrictions on vehicle size at eastern at Branxton due to railway bridges.	Potential for transverse sloping across the cable working width to occur south of Innerwick. Minimal elevational change along the route although requires crossing of Thornton Burn.
M – AC RC2	3.8k	Corridor contains 1 designated heritage asset and 2 non-designated assets.	The corridor crosses sections of Dunglass Burn and Ogle Burn with tree cover and 1 linear belt of ancient woodland (long established plantation).	Crosses Dunglass Burn Local Biodiversity Site in two places.	2 minor road crossing required. Access generally reasonable from the A1; some restrictions on vehicle size at Branxton due to railway bridges. Access to the section across Cocklaw Hill / Blackcastle Hill will require a lengthy haul road.	Steep sections of elevational change present as the corridor runs down and crosses Ogle Burn where inclines with a gradient of approximately 27% were identified. Steep sloped sections and transverse crossings on the northern side of Blackcastle Hill, which will require substantial civil engineering groundworks and cable restraint constructions. Cost implications relating to rock breaking and removal.

Corridor	Approx Length	Heritage	Landscape & Visual	Ecology	Access	Technical
M1/2/3 AC Eng1	4.35km	Corridor contains 1 designated asset and several non-designated assets and a possible trackway. The corridor contains a lower density of non-designated assets compared to RC1.	The corridor crosses Ogle Burn and Thurston Mains Burn (Elmscleugh Water), a small area of ancient woodland (long established plantation) and several field hedgerow boundaries.	The corridor crosses Dunglass Burn Local Biodiversity Site in two locations as well as mainly arable or grassland fields. The M1, M2 and M3 spurs pass through areas of long-established woodland.	2 minor road crossing required. Access generally reasonable from A1; some restrictions on vehicle size at Branxton due to railway bridges. Access to Thurston Mains is reasonable as there are no railway bridges. Height restrictions could affect the transportation of cable drums.	Sloped sections to the north of Blackcastle Hill that may present some civil engineering challenges. Cable anchoring solutions likely to be required to safeguard the long term performance of the cable system and some cutting and filling to level out the effect of transverse slopes. The crossing at Ogle Burn is within a deep wooded cleugh (ravine), where a cable bridge crossing rather than an HDD might be required due to drill angle and drilling depth might be limiting.
Summary: Preferred M corridors: M DC RC5 and M AC RC1						
G – DC RC1	1km	No designated or non-designated heritage assets. As with all other corridors there is the potential for the discovery of previously unidentified remains.	1 property lies just within 200m of the route corridor, unlikely to have views of construction works. The corridor crosses 2 field boundaries with shrub/trees.	Does not cross or lie immediately adjacent to any designated sites.	Assumes combined landfall HDD of A1 and railway. 1 minor road crossing required. Access is height restricted immediately to the north of the route; alternative route via Birnieknowes available.	Unknown interface issues between Eastern Link and the proposed Berwick Bank OWF infrastructure. The east coast mainline railway runs parallel with the corridor for the entire route length (approximately 838m) with potential for exposure to earth return currents associated with the railway electrification systems and vibrational disturbance (ie potential to reduce the maximum electrical current that can be carried by the cable).
G – AC RC1	900m	Corridor contains no designated heritage assets and 1 non-designated asset.	1 property lies just within 200m of the corridor with likely limited views of construction works. The corridor crosses 3 field boundaries with little in the way of hedgerow/trees.	Does not cross or lie immediately adjacent to any designated sites.	No road crossings required. Access via minor roads. Restrictions on vehicle size due to railway bridges on minor roads serving Lawfield and Branxton.	Corridor runs in close proximity to and crosses potential Berwick Bank OWF circuits as well as passing through potential Berwick Bank infrastructure; unknown interface issues.

Note: The above corridors assume a landfall at southern end of Thorntonloch and a substation at R1/R2

Option	Details
PREFERRED OPTION	Greatest potential to accommodate the infrastructure required within the context of the environmental constraints identified.

Option	Details
SOME POTENTIAL	Some potential to accommodate the infrastructure required within the context of the environmental constraints identified.
LEAST POTENTIAL	Least relative potential to accommodate the required infrastructure within the context of the environmental constraints identified.



- Legend:**
- Potential Landfall Location
 - Preferred Sites
 - Existing Infrastructure
 - Transmission Substation
 - Transmission Cable
 - Transmission Overhead Lines
 - Potential Route Corridors
 - M - AC RC1
 - M - AC RC2
 - M - DC RC1
 - M - DC RC2
 - M - DC RC3
 - M - DC RC4
 - M - DC RC5
 - G - AC RC1
 - G - DC RC1
 - M1 - AC Eng1
 - M2 - AC Eng1
 - M3 - AC Eng1

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

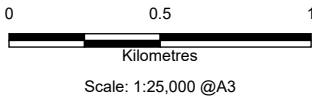


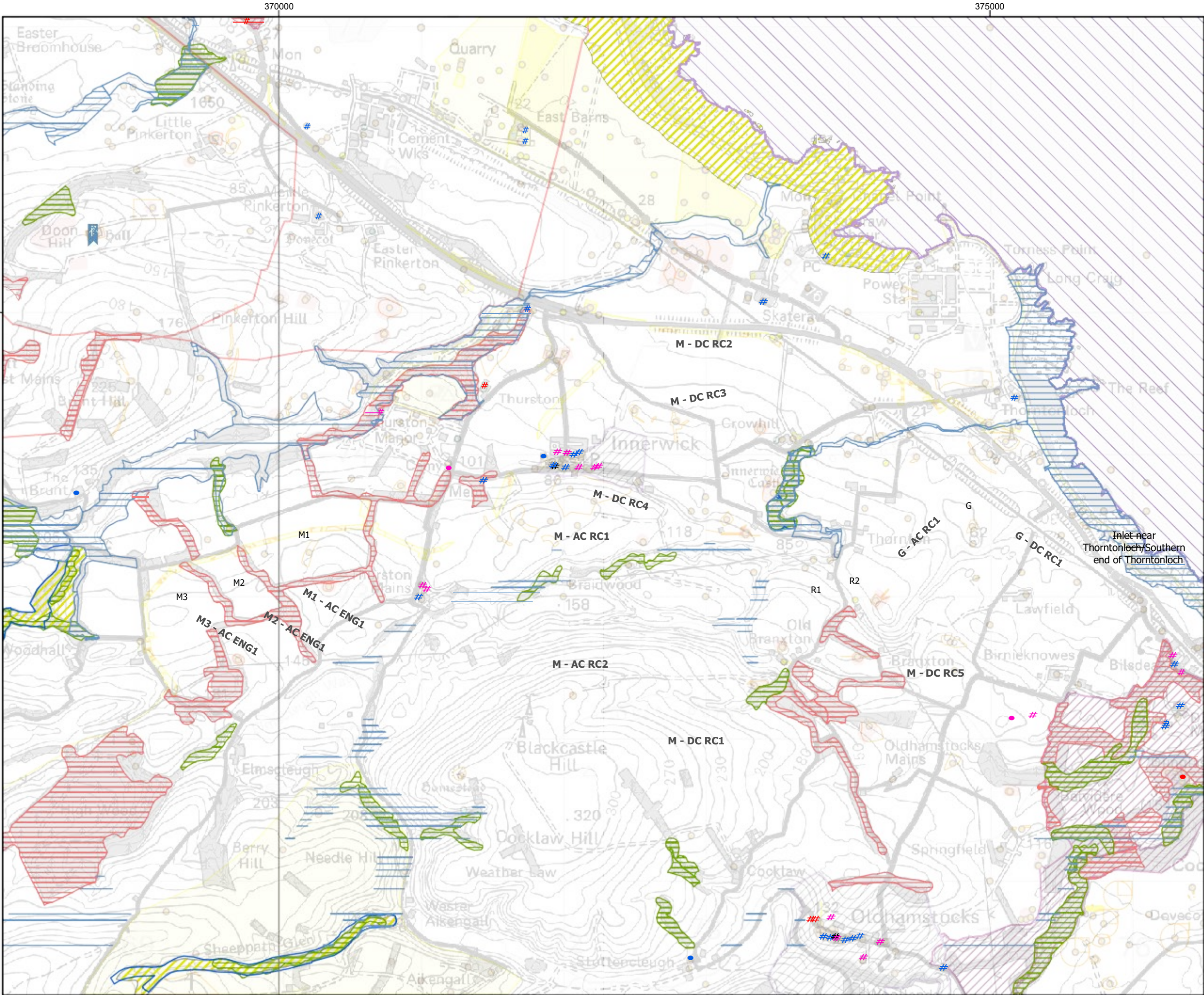
05	16/12/2020	Revised Corridors	DL	KB	HB
04	03/12/2020	Additional Corridor	DL	KB	KB
03	21/10/2020	Additional Corridors	DL	KB	KB
Rev	Date	Description	Drn	Chk	App

Eastern Link - Torness Project



TITLE: Figure 5.1:
Potential Route Corridor Options





- Legend:**
- Potential Landfall Location
 - Preferred Sites
 - Potential Route Corridors
 - M - AC RC1
 - M - AC RC2
 - M - DC RC1
 - M - DC RC2
 - M - DC RC3
 - M - DC RC4
 - M - DC RC5
 - G - AC RC1
 - G - DC RC1
 - M1 - AC Eng1
 - M2 - AC Eng1
 - M3 - AC Eng1
 - Environmental Constraints
 - Wildlife Reserve
 - Ancient Woodland (of semi-natural origin)
 - Long-Established Ancient Woodland (of plantation origin)
 - Proposed Special Protection Areas
 - Sites of Special Scientific Interest
 - Local Biodiversity Site
 - Historic Constraints
 - Properties in care
 - Listed Building Category A
 - Listed Building Category B
 - Listed Building Category C
 - Building
 - Maritime
 - Event
 - Event
 - Monument
 - Monument
 - Monument
 - Battlefields
 - Conservation Area
 - Gardens and Designed Landscapes
 - Scheduled Monuments



Rev	Date	Description	Drn	Chk	App
00	15/12/2020	First Draft	DL	KB	KB

Torness Project



TITLE: Figure 5.2:
Ecological and Historic Designations -
Route Corridor Options

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Kilometres

Scale: 1:25,000 @A3

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6 PREFERRED OPTION

This section of the Options Appraisal Report provides a summary comparison of the short-listed converter station siting options and cable corridor options that were appraised in Sections 4 and 5, and identifies a preferred option to take forward to the next stage of the Project. As discussed in Section 4, consideration of technical and environmental factors relating to the shortlisted landfall and substation site options, identified southern Thorntonloch as the preferred landfall and Site R1 as the preferred substation site. Engineering studies relating to the marine cable route identified a preference for a landfall at a point between the two shortlisted landfall locations (Thorntonloch Beach and Inlet near Thorntonloch). The preferred location at southern Thorntonloch is outwith a SSSI designation, and avoids cable crossings and extensive areas of bedrock in nearshore waters. Of the two shortlisted substation sites (R1 and R2), Site R1 was identified as being preferred as it offers a larger site that would facilitate the Eastern Link, as well as providing a connection to Berwick Bank OWF. It is also large enough to accommodate any future expansion plans.

Through consideration of environmental, technical and cost implications of different siting and routeing options at an early stage, SP Energy Networks is meeting the duty placed upon it under the Electricity Act 1989 to formulate proposals which meet the technical requirements of the electricity system, which are economically viable and on balance cause the least disturbance to the environment and the people who live, work and enjoy recreation within it.

6.1.1 Converter Station Options

6.1.1.1 *Landscape and Visual*

Of the short-listed sites (G, M1, M2 and M3), none are located in internationally or nationally designated areas of the highest amenity value, or within any locally designated Special Landscape Areas. However, the M sites are adjacent to areas of ancient woodland and any development on the M sites should ensure the preservation of the ancient woodland. Development on all four short-listed sites would introduce new large structures into currently undeveloped arable fields which would impact landscape character and pattern.

The screening afforded by landform and woodland for Sites M2 and M3, and to a lesser extent M1, is likely to limit adverse landscape and visual effects. In contrast, the lack of existing screening and the more exposed location of Site G mean that this site is less preferred to the M sites in terms of likely visual impact. The existing woodland around M2 provides a significant level of visual screening, greater than for either M1 or M3. All the M sites, but Site M2 in particular, benefits from having very few visual receptors which would be impacted by development on these sites.

All four sites could accommodate the proposed converter station and with regard to likely landscape impacts, impacts on all four sites would be of a similar nature. However, in terms of visual amenity, Sites M2 and M1 are preferred, with Site G the least preferred.

6.1.1.2 *Heritage*

None of the short-listed sites would give rise to direct physical impacts to a listed building, scheduled monument or Inventory Garden and Designed Landscape. However, all four sites do occur in sufficient proximity to listed buildings for the potential for impacts to the setting of a listed building to be a consideration.

All four sites are located in previously undisturbed green field locations and have been identified as having high potential for the discovery of buried archaeological remains. Mitigation by excavation in advance of construction would be required should evaluation identify any remains of archaeological significance; this would apply to all four sites.

Given the above, heritage considerations are of a similar nature for all four short-listed sites and not considered to be a determining factor in identifying a preferred option.

6.1.1.3 *Ecology*

All four short-listed sites avoid internationally or nationally designated sites and nature conservation areas.

All four sites are within agricultural fields. Sites M1, M2 and M3 have long-established woodland (of plantation origin) (ancient woodland) surrounding (but outwith) the sites. Suitable protection would be required to mitigate potential impacts to these adjacent areas. Assuming that the adjacent ancient woodland in the shelter belts surrounding Sites M1, M2 and M3 is not impacted, all four sites are of a similar nature in terms of existing ecological habitat.

All four sites have potential suitability for a number of protected species including badgers, bats and great crested newt. All sites also have potential suitability for wintering birds.

The above species have the potential to be affected directly (i.e. loss of habitat and inadvertent killing during site clearance) and / or indirectly (i.e. disturbance) during the construction phase of the development. Given that all sites have the potential for protected species to occur, with the confirmation of presence/absence requiring field survey, protected species are not considered to be a determining factor in identifying a preferred option.

6.1.1.4 *Access*

Access to Site G is constrained from the A1 due to bridges over the railway which are restricted in road alignment and width/weight. Construction access could be taken from the west at the Innerwick Junction (south of the railway), before heading east along rural lanes, passing through Crowhill. However this route has residential receptors and potentially restricted road alignment. Further analysis would be required to assess this as a potential route for abnormal loads.

Access to Sites M1, M2 and M3 would be via Innerwick Junction on the A1. The route beyond the A1 is initially of a reasonable width, narrowing and increasing in gradient as it passes Thurston Manor Caravan Park. Local to the site, the rural road is single carriageway, although provides a two-way section at its eastern end. The route for construction traffic avoids residential areas, with the exception of Thurston Manor Caravan Park. Abnormal loads have been transported along the route from the A1

associated with wind farms, however some adjustment to the priority junction local to the site is likely to be required.

All four site options would require mitigation measures such as a construction traffic management plan or installation of temporary passing bays to minimise temporary impacts on the transport network.

In terms of access Sites M1, M2 and M3 are preferred over Site G from a transport perspective.

6.1.1.5 Land Use (Hydrology and Flood Risk)

In terms of flood risk, the northern portion of Site M2 is recorded as having High/Medium flood risk from surface water. Some very minor localised areas within Site M1 and M3 are also shown as having High/Medium flood risk from surface water although these are not representative of the overall sites. Should development at Site M2 be pursued this would need to consider flood-resilient infrastructure and provision for alternative flood storage. Site M2 would be least preferred from a flood risk perspective.

There are no watercourses within the four sites although there is potential for all four sites to contain field drains/minor watercourses.

6.1.1.6 Technical

Engineering concerns include access. Those issues are described under access above; Sites M1, M2 and M3 are preferred over Site G from an access perspective. In terms of Site G, the Berwick Bank onshore substation is potentially located in same area and the site would not be large enough to accommodate both developments; the site size is limited and may not allow for future expansion.

6.1.1.7 Preferred Converter Station Site

Following consideration of the technical, economic and environmental factors relating to each of the converter station site options, it is concluded that the preferred option for the converter station site is Site M2.

6.1.2 Cable Route Options

6.1.2.1 Landscape and Visual

Of the M site corridors considered, none are located in internationally or nationally designated areas of the highest amenity value. Corridors M-DC RC1, M-AC RC2 and M-AC ENG1 all have significant stretches (minimum of 2.6 km) within locally designated East Lothian – SLA 4 Monynut to Blackcastle. Corridors M-AC RC1, M-DC RC4 and M-DC RC5 all cross SLA 4 Monynut to Blackcastle for between 140-200 m. Corridors M-DC RC2 and M-DC RC3 both avoid all the SLA within the study area.

All corridors cross or contain sections of ancient woodland, field hedgerow boundaries and one or more burns. To some degree construction work for all corridors will be visible from identified visual receptors, however construction work within corridors M-DC RC2, M-DC RC3 and to a lesser extent M-DC RC4 would impact more receptors than other corridors, particularly from Innerwick and Thurston Manor Leisure Park. The exposed route of corridor M-DC RC1 on high ground would also create a visual impact during

construction works on the wider area. With regard to the AC corridors, construction work within M-AC RC1 and M-AC ENG1 would be visually well contained, whereas construction work along the proposed route of M-AC RC2 would potentially be visible from a wider area.

With regard to the differing DC corridor routes, corridor M-DC RC5 is the preferred corridor as it excludes the SLA within the study area except for a short ~150 m stretch of the corridor and the construction work would not be as visually intrusive as any of the other proposed DC corridors, with a very limited number of residential receptors within 100 m of the proposed corridor route. With regard to the proposed AC corridors, landscape and visual considerations are the same for M-AC RC1 and M-AC ENG1, whilst route M-AC RC2 is the least preferred.

6.1.2.2 *Heritage*

Corridors M-DC R2, M-DC R4 and M-DC RC5 have a high density of designated and non-designated assets. M-DC RC1 contains a relatively low density of recorded non-designated assets; however, this may in part be due to assets being less readily identifiable through aerial photography in comparison to the flatter, lower coastal areas to the north, and a lower amount of geophysical survey having been undertaken in this area. M-DC RC3 contains three designated assets, including the Category C listed Thurston East Lodge (LB7710) and several non-designated assets, including settlements at Thornton Mill/Thornton Burn (MEL2562). On the assumption that the physical footprint of the cable route follows the existing underground cable which SP Energy Networks has advised may require replacement, this option would be the least impacting on previously identified and potentially previously unidentified undisturbed archaeological remains.

Of the M corridors considered for the AC cable, M-AC RC1 is least preferred as the corridor contains more designated assets within it than the alternatives, including Castledene Enclosure (SM5849) and Braidwood Enclosure (SM5848).

6.1.2.3 *Ecology*

All M-DC corridors cross several field boundaries and pass through arable and grassland fields that are generally of low ecological value. However the fields may be used by ground nesting or wintering birds. All M-DC corridors cross through areas of long-established woodland that may support roosting bats, nesting birds and other protected species. M-DC RC1, M-DC RC4 and M-DC RC5 cross Dunglass Burn Local Biodiversity Site whilst M-DC RC2 and M-DC RC3 cross an area designated as Thurston Burn Valley 2 Local Biodiversity Site/Thornton Glen SWT Reserve, both of which have the potential to support Otter and, less likely, Water Vole. Of the M-AC corridors considered, both M-AC RC1 and M-AC RC2 cross sections of the North Lammermuir Valleys which are steep sided valleys with trees that may support roosting bats and nesting birds. All M-AC corridors cross Dunglass Burn Local Biodiversity Site; M-AC-RC2 and M-AC-ENG1 cross the site twice. All corridors are of generally similar nature in terms of existing ecological habitat. All corridors have the potential for protected species to occur.

6.1.2.4 *Access*

Of the M corridors considered, M-DC RC1 is the least preferred. Access to the section across Cocklaw Hill / Blackcastle Hill would require a lengthy haul road (similar for M-AC

RC2). The remaining M site corridors are generally similar in terms of access restrictions. Access to the eastern section of the DC corridors would be from the minor roads serving Birnieknowes, Old Branxton and Branxton, all of which are restricted in height on the size of vehicle due to these roads passing beneath the East Coast Main Line. Access to the western section of the DC corridors would be from the minor road serving Thurston Mains. Access to this location is generally reasonable from the A1 as there are no railway bridges.

6.1.2.5 *Land Use (Hydrology and Flood Risk)*

All M corridors cross burns with associated flood risk zones confined to the immediate banksides. There are a number of small isolated areas of surface water flood risk (high, medium and low risk) within the corridors. M-DC RC5 requires the least number of watercourse crossings.

6.1.2.6 *Technical*

Of the M corridors considered, M-DC RC2 and M-DC RC4 are the least preferred in terms of technical constraints. Both corridors cross and run in close proximity to key existing/proposed wind farm infrastructure (with potential to reduce the carrying capacity of the electrical cable) and railway infrastructure (with potential for exposure to earth return currents associated with the railway electrification systems and vibrational disturbance). Corridor M-DC RC4 also contains some sections of elevational change to the south of Thornton at Thornton Burn and south of Innerwick; this could potentially require sections of the cable route to be cut and filled which would represent a significant civil engineering challenge. Corridors M-DC RC1 and M-AC RC2 contain the greatest elevational change along corridor length, with sections of the cable route at Blackcastle Hill containing inclines with a gradient of up to approximately 20% which present substantial civil engineering challenges. Corridor M-AC ENG1 includes some sloped sections to the north of Blackcastle Hill that may present some civil engineering challenges. In addition, the crossing at Ogle Burn is within a deep wooded cleugh (ravine), where a cable bridge crossing rather than an HDD might be required due to drill angle and drilling depth might be limiting.

The CCI engineering review identified that the M corridors providing the least technical risk are M-DC RC5 and M-AC RC1. Corridor M-DC RC5 follows, but does not cross, existing/proposed wind farm circuits offering the potential to utilise pre-existing cable swathes where possible. The corridor does contain several sections of elevational change including southwest of Innerwick and requires a crossing of Thornton Burn. Corridor M-AC-RC1 is both the shortest and contains the least elevational change along its length of all the M site HVAC circuits considered. There are still some sections of elevational change including at Thornton Burn. The CCI review noted that there could be some advantage in utilising the same cable swathe for both the HVDC and HVAC circuits in the corridor section between the converter station site and Branxton. Corridor M-DC RC5 offers the ability to provide a combined HVDC and HVAC corridor and hence was identified as the preferred option to be taken forward.

6.1.2.7 *Cost*

The G site cable corridors have shorter DC and AC cable routes and hence lower cable and construction costs compared with the M sites. In terms of cable installation, there is

potential for shallow bed rock to be located on the slopes of Blackcastle Hill within corridors M-DC RC1 and M-AC RC2. Alternative cable installation methods other than normal excavator digging techniques may be necessary if micro-routeing is not successful. There are potential cost implications due to rock breaking and removal with these options.

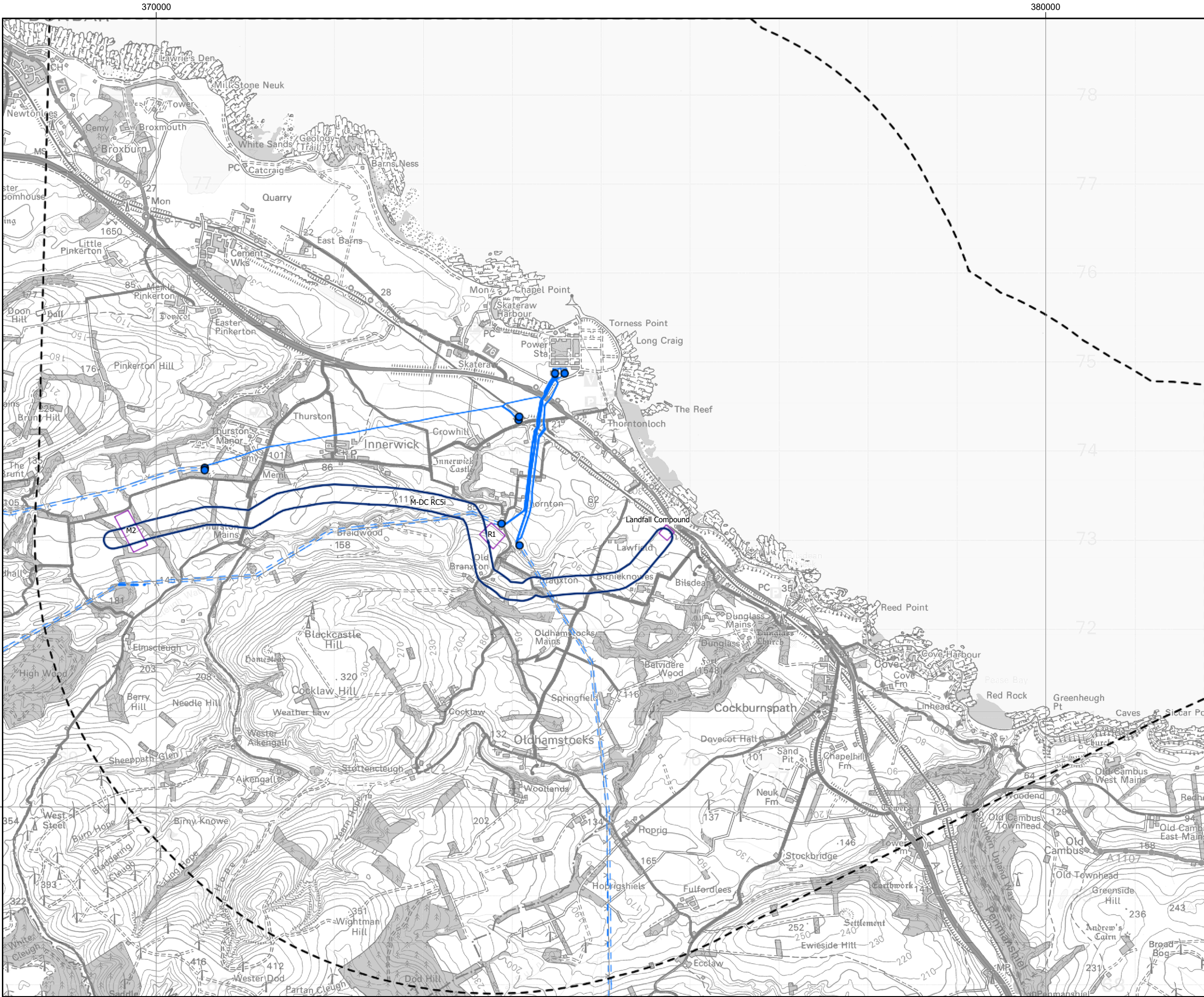
6.1.2.8 *Preferred Corridor*

Following consideration of the technical, economic and environmental factors relating to each of the M sites, cable corridor options, it is concluded that the preferred option is M-DC RC5 and M-AC RC1.

6.1.3 **Preferred Option**

Following consideration of the technical, economic and environmental factors relating to each of the site options and cable route corridor options, it is concluded that the preferred option for the Project is: landfall at southern Thorntonloch, Substation Site R1 and Converter Station Site M2 with HVDC cable route M-DC RC5 and HVAC cable route M-AC-RC1. The southern Thorntonloch landfall, R1/M2 site, M-DC RC5 / M-AC RC1 corridor option is considered to offer the best balance of technical, environmental and economic considerations as far as possible.

As discussed in Section 5.1, M site cable route corridor options were not considered individually for each of the Sites M1, M2 and M3 at this stage (with the exception of the MAC-ENG routes); rather corridor options connecting to the general vicinity of the M sites (connecting at M1) and to the general vicinity of a substation sites at R1/R2 were identified for the purpose of comparing corridor options. Further to the selection of M-DC-RC5 as preferred, a route corridor M DC RC5i has been identified to facilitate connection to M2 and combine both HVDC and HVAC circuits. The preferred option is shown on Figure 6.1.



- Legend:
- Study Area
 - Preferred Route Corridor
 - Preferred Sites
 - Existing Infrastructure
 - Transmission Substation
 - Transmission Cable
 - Transmission Overhead Lines

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

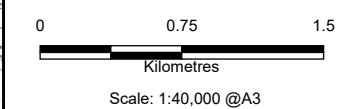


Rev	Date	Description	Drn	Chk	App
00	15/12/2020	Preferred Option	DL	KB	KB

Eastern Link - Torness Project



TITLE: Figure 6.1:
Preferred Option



7 SUMMARY

This study has appraised a number of siting options for a landfall and new substation and converter station required as part of the Project. The study has also appraised a number of cable route options which will facilitate the connection. The options have been considered in relation to environmental and socio-economic constraints, as well as technical and cost implications.

The aim of this study was to identify suitable sites and corridors within the Torness locality that are potentially suitable to accommodate the required electricity transmission equipment (comprising a converter station, substation and associated cable routes and landfall) required for the Project.

To meet the site/routeing selection objective and to reduce the need for new long sections of overhead transmission lines, the new substation will be ideally located in close proximity to the existing sealing end compounds and the existing 400kV overhead lines in the vicinity of Branxton.

Environmental constraints data was collated and incorporated into GIS and formed a basis for interrogating priorities and comparative analysis of siting and routeing options. A robust options appraisal was used to compare options across a wide range of criteria including environmental, socio-economic, technical and cost factors.

Based on the appraisal undertaken, landfall at southern Thorntonloch, Substation Site R1 and Converter Station Site M2 with HVDC cable route M-DC RC5 and HVAC M-AC RC1 refined as M-DC RC5i (incorporating both HVDC and HVAC circuits) is considered to meet the routeing objective. It meets the technical requirements of the electricity system, is economically viable and causes, on balance, the least disturbance to the environment and the people who live, work and enjoy recreation within it. This preferred option will be the basis for the next stage of the Project – public consultation. Following a review of the feedback SP Energy Networks will confirm a proposed option which will be subject to environmental impact assessment. Detailed siting and design options will feed into the proposed option and SP Energy Networks will submit applications to East Lothian Council for planning permission on this basis.

8 REFERENCES

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APPENDIX 1 PHOTO LOG

Converter Station Options

Site CD1



Site CD1



Site CD1



Converter Station Options

Site D2



Site D2



Site D2



Towards Site D2 from coast



Converter Station Options

Site M2



Converter Station Options

Site M3



Site M3



Converter Station Options

Site G



Site G (towards coast)



Converter Station Options

Site G1



Converter Station Options

Site RSK1



Site RSK1



Converter Station Options

Site E2



Site E2



Converter Station Options

Site M1



Site M1



Site M1



Site M1



Converter Station Options

Site E1



Site E1



Converter Station Options

Site CD3



Substation Options

Site R2



Substation Options

Site R1



Substation Options

Site M2



Substation Options

Site M3



Site M3



Substation Options

Site L2



Landfall Options

Site 1 – Whitesands Bay Beach



Site 1 – Whitesands Bay Beach



Site 1 – Whitesands Bay Beach



Landfall Options

Site 2 – Barns Ness



Site 2 – Barns Ness



Site 2 – Barns Ness



Landfall Options

Site 3 – Thorntonloch Beach



Site 3 – Thorntonloch Beach





Landfall Options

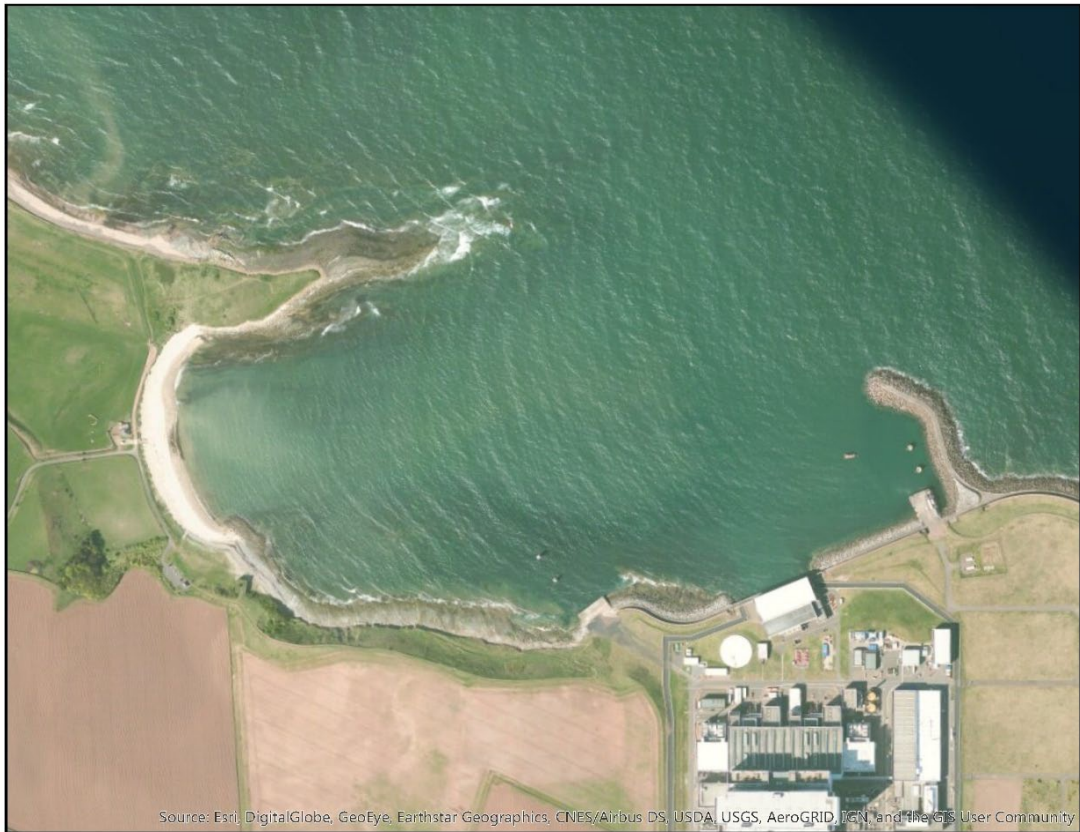
Site 4 – Skateraw Harbour



Site 4 – Skateraw Harbour



Site 4 – Skateraw Harbour



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Landfall Options

Additional Site 1 – Cove Harbour



Additional Site 1 – Cove Harbour



Additional Site 1 – Cove Harbour



Landfall Options

Additional Site 2 – Pease Bay



Additional Site 2 – Pease Bay



Additional Site 2 – Pease Bay



Landfall Options

Additional Site 3 – Barns Ness North



Additional Site 3 – Barns Ness North



Additional Site 3 – Barns Ness North



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

APPENDIX 2 SUMMARY OF PLANNING APPLICATION SEARCH

Appendix 2: Planning Application Search Results (updated 7/12/2020)

East Lothian Council

Application No.	Summary of Application	Status/ Decision	Validated	Site Address
20/01168/P	Erection of 1 house and associated works	Awaiting Decision	Fri 13 Nov 2020	28 Springfield Terrace West Barns Dunbar EH42 1UL
20/01066/P	Erection of 2 sheds (Part retrospective)	Decided	Thu 15 Oct 2020	6 The Vennel Dunbar EH42 1HF
20/00886/P	Alterations and extensions to hotel	Decided	Thu 10 Sep 2020	Bayswell Hotel 16 Bayswell Park Dunbar EH42 1AE
20/00858/P	Erection of utility container, fencing and formation of decking area	Awaiting decision	Wed 14 Oct 2020	Hallhill Healthy Living Centre Lochend Road Dunbar EH42 1RF
20/00005/PAN	Construction of Polymers Recycling facility	Proposal of application notice accepted	Wed 19 Aug 2020	Dunbar Landfill Site Oxwellmains Dunbar East Lothian EH42 1SW
20/00769/PP	Planning permission in principle for the erection of wind turbine and formation of access	Decided	Mon 27 Jul 2020	Belhaven Fruit Farm Hedderwick West Barns Dunbar East Lothian EH42 1ST
20/00662/P	Alterations, extensions to hotel, formation of stairway, steps and erection of 9 self-contained rooms	Decided	Tue 14 Jul 2020	Bayswell Hotel 16 Bayswell Park Dunbar East Lothian EH42 1AE
20/00553/LBC	Alterations, extensions to buildings and erection of buildings, gates and gate piers	Awaiting decision	Mon 15 Jun 2020	The Stables Broxburn Broxburn Dunbar East Lothian EH42 1QW
20/00492/P	Conversion, including heightening of roof of former coastguard station to form holiday accommodation	Decided	Thu 14 May 2020	Former Coastguard Station Lamer Street Dunbar EH42 1HD

Application No.	Summary of Application	Status/ Decision	Validated	Site Address
20/00454/P	Erection of double garage	Decided	Thu 30 Apr 2020	16 & 17 Steadings Crescent Dunbar East Lothian EH42 1GR
20/00436/P	Extension to house to form ancillary residential accommodation	Decided	Thu 23 Apr 2020	24 Rennie Drive Dunbar East Lothian EH42 1XU
20/00411/P	Erection of shed	Decided	Fri 24 Apr 2020	Wisterias Stenton Dunbar East Lothian EH42 1TE
20/00323/P	Erection of 2 sheds and formation of decked areas with balustrade	Decided	Mon 06 Apr 2020	Rose Cottage High Road Spott Dunbar EH42 1RJ
20/00001/PAN	Construction of Plastics recycling facility	Proposal of application notice accepted	Mon 02 Mar 2020	Dunbar Landfill Site Oxwellmains Dunbar East Lothian EH42 1SW
20/00164/P	Change of use of agricultural land to equestrian/dog exercise yards, erection of associated amenity building and associated works	Decided	Fri 21 Feb 2020	Pleasance Farmhouse Spott West Barns Dunbar EH42 1RE
20/00137/P	Conversion of former coast guard station to form 1 house	Decided	Mon 17 Feb 2020	Coastguard Station Lamer Street Dunbar EH42 1HD
20/00134/P	Formation of hardstanding, car parking areas, erection of canopy, covered walkway, installation of bollards and electric car charging points	Decided	Thu 27 Feb 2020	Asda Stores Limited Spott Road Dunbar EH42 1BF
19/01278/P	Erection of building for business use	Awaiting decision	Fri 03 Jan 2020	New Hope East Links Road Dunbar East Lothian EH42 1LT
19/01256/P	Erection of building	Decided	Fri 28 Feb 2020	Dunbar Wastewater Treatment Works Beltonford Hedderwick West Barns Dunbar East Lothian EH42 1ST

Application No.	Summary of Application	Status/ Decision	Validated	Site Address
19/01167/P	Conversion of agricultural buildings to form 1 house, garage and associated works	Decided	Mon 18 Nov 2019	Farmhouse Thorntonloch Innerwick Dunbar East Lothian EH42 1QS
19/01114/P	Change of use of open space to form hardstanding area for car parking	Decided	Tue 26 Nov 2019	West Barns Community Hall Edinburgh Road West Barns Dunbar East Lothian EH42 1UP
19/01111/P	Change of use of a day nursery and grounds to 1 house with domestic garden ground and installation of vents	Decided	Tue 12 Nov 2019	7 - 9 Duke Street Belhaven Dunbar East Lothian EH42 1NS
19/01040/P	Erection of agricultural building	Decided	Tue 15 Oct 2019	Land North Of Keepers Cottage And Kennels Spott Home Farm Dunbar East Lothian EH42 1RL
19/01039/LBC	Alterations and extension to building	Decided	Wed 23 Oct 2019	Gardener's Cottage Ninewar Dunbar East Lothian EH42 1XQ
19/01033/P	Alterations and extensions of derelict building to form ancillary residential accommodation for Ninewar	Decided	Thu 24 Oct 2019	Gardener's Cottage Ninewar Dunbar East Lothian EH42 1XQ
19/00970/NAF	Prior notification of – Erection of agricultural building	Decided	Thu 03 Oct 2019	Land To The South Of Thornly Dunbar East Lothian EH42 1QS
19/00831/P	Alterations, change of use of warehouse storage/office building to form a children soft play area with café, change of open space to form pedestrian access and associated works	Decided	Mon 26 Aug 2019	Dunbar Business Centre Spott Road Industrial Estate Dunbar East Lothian EH42 1RS
19/00549/P	Formation of access road (Retrospective)	Grant Permission Retrospectively	June 2019	Belhaven Caravan Park Edinburgh Road West Barns Dunbar East Lothian EH42 1TS

Application No.	Summary of Application	Status/ Decision	Validated	Site Address
19/00387/P	Installation of section of underground electricity cabling	Permission Granted	April 2019	Land To The South/West Of The Dual Carriageway To Skateraw Junction Dunbar East Lothian
19/00095/P	Permanent retention of construction compound for regular maintenance of the energy recovery facility and associated works	Permission granted	March 2019	Viridor ERF Innerwick Dunbar East Lothian EH42 1SW
19/00001/PAN	Development of a new golf clubhouse, hotel and associated driving range and practice facilities with associated car parking, maintenance, access and landscaping. Additional development of new homes (with associated access and landscaping works) as enabling development to cross fund the new clubhouse and other golf related development (exact number to be confirmed as part of the application process -c70-75).	Proposal of application notice accepted	Feb 2019	Dunbar Golf Club East Links Road Dunbar East Lothian EH42 1LL
18/00904/P	Change of use of agricultural land for the siting of 2 glamping pods for holiday let and associated works	Application withdrawn	Sept 2018	Land To The North/West Of Keepers Cottage And Kennels Spott Home Farm Dunbar East Lothian EH42 1RL
18/00801/P	Alterations and change of use of kennel building to form holiday let accommodation	Permission granted	Aug. 2018	Kennels Spott Home Farm Dunbar East Lothian EH42 1RL
18/00823/P	Erection of 2 wind turbines and associated works	Permission granted	Aug 2018	The Granary Ferneylea Oldhamstocks Innerwick East Lothian TD13 5YN
18/00526/P	Erection of a cement mill grinding station, cement storage silo, rail loading facility, shed, belt conveyors, pneumatic pipelines and associated works	Permission granted	May 2018	Dunbar Works Innerwick Dunbar East Lothian EH42 1SL
18/00482/P	Erection of shed and summerhouse	Permission granted	May 2018	Beechworth Queens Road Dunbar East Lothian EH42 1LN
18/00431/PM	Renewal of planning permission 15/00022/PM - Construction and operation of a leachate treatment plant (LTP) comprising a series of storage and treatment tanks within a surfaced and bunded compound, together with lagoons, reed beds and ancillary plant and infrastructure.	Permission granted	May 2018	Dunbar Landfill Site Innerwick Dunbar

Application No.	Summary of Application	Status/ Decision	Validated	Site Address
17/00865/P	Formation of vehicular access road	Permission granted	Oct 2017	Dunbar Landfill Site Innerwick Dunbar East Lothian EH42 1SW
17/00701/P	Erection of agricultural building	Permission granted	Aug 2014	Hedderwick Farm Dunbar East Lothian EH42 1SX
17/00679/P	Erection of electricity substation	Permission granted	July 2017	Dunbar Works Innerwick Dunbar East Lothian EH42 1SL
17/00030/P	Erection of cabin for holiday let accommodation and associated works (Retrospective)	Permission granted retrospectively	March 2017	Ground At Broxmouth House Broxmouth Park Dunbar East Lothian EH42 1QW
17/00020/PPM	Planning permission in principle for residential development and cemetery, with associated access, infrastructure, landscaping and open space	Permission granted	Jan 2017	Land At Newtonlees Farm Dunbar East Lothian EH42
16/00668/P	Erection of 1 chalet for holiday let and associated works	Permission granted	Sept 2016	West Meikle Pinkerton Farm Innerwick Dunbar East Lothian EH42 1RX
16/00649/P	Erection of electricity substation	Permission granted	Sept 2016	Skateraw Farm Dunbar East Lothian EH42 1QR
16/00015/PAN	Planning permission in principle for residential development and a cemetery, with associates' access, infrastructure, landscape and open space	Proposal of Application Notice	July 2016	Land At Newtonlees Farm Dunbar East Lothian EH42
16/00618/P	Variation of Condition 22 of planning permission 06/00839/FUL to allow for 5 of the 18 houses to be created from the conversion of the group of steading buildings (units 1, 15, 16, 17 and 18) to be occupied prior to the easternmost agricultural buildings being demolished and the materials removed from the site	Granted permission	Oct 2016	Pleasance Farm Dunbar East Lothian EH42 1RE
16/00430/P*	Erection of steel containers for training facility, erection of fencing and gates	Permission granted	June 2016	Torness Power Station Dunbar East Lothian EH42 1QS
Ref. No: 15/00390/P	Renewal of planning permission 12/00347/P - Extension to electricity substation compound including associated boundary treatments	Permission granted	May 2015	Crystal Rig Substation By Dunbar East Lothian EH42 1SH

Application No.	Summary of Application	Status/ Decision	Validated	Site Address
Ref. No: 15/00255/P	Erection of agricultural building	Permission granted	March 2015	Aikengall Innerwick Dunbar East Lothian EH42 1SG
15/00093/P	Erection of agricultural building	Permission granted	Feb 2015	9 Thorntonloch Holdings Innerwick Dunbar East Lothian EH42 1QS
Ref. No: 15/00035/P	Erection of Office and Welfare building	Permission granted	Feb 2015	Torness Power Station Dunbar East Lothian EH42 1QS
Ref. No: 15/00022/PM	Construction and operation of a leachate treatment plant (LTP) comprising a series of storage and treatment tanks within a surfaced and bunded compound, together with lagoons, reed beds and ancillary plant and infrastructure	Permission granted	Feb 2015	Dunbar Landfill Site Oxwellmains Dunbar East Lothian EH42 1SW
Ref. No: 14/01013/EOL	Erection of 11kv overhead line	Approved via Permitted development	Dec 2014	Aikengall Wind Farm Innerwick Dunbar East Lothian EH42 1SG
Ref. No: 14/00934/P	Erection of building	Permission granted	Dec 2014	Torness Power Station Dunbar East Lothian EH42 1QS
Ref. No: 14/00861/PP	Planning permission in principle for erection of 1 house	Permission granted	Oct 2014	Blackcastle Farm Innerwick Dunbar East Lothian EH42 1QT

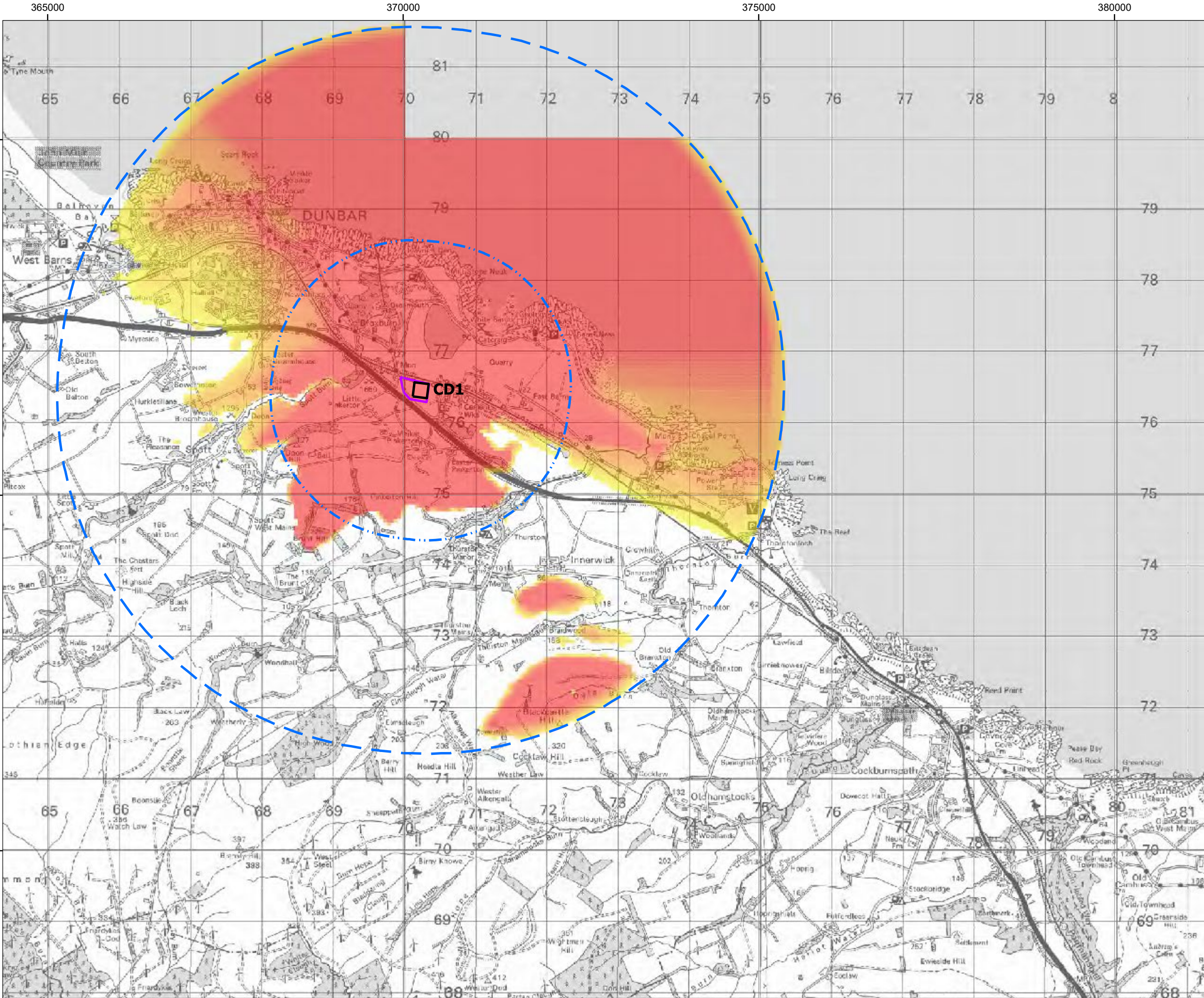
Scottish Borders Council

Application No.	Summary of Application	Status/ Decision	Application Received	Site Address
20/01152/ful	Erection of replacement dwelling house	Registered	Tue 29 Sep 2020	The Ramparts Cockburnspath Scottish Borders TD13 5XE
20/01037/SCO	Berwick Bank Offshore Wind Farm	Awaiting decision	Tue 08 Sep 2020	Land North Of 1 East End Cove Cockburnspath Scottish Borders
20/00955/NECON	Berwick Bank Wind farm on shore transmission works	Unknown	Mon 24 Aug 2020	Land North Of 1 East End Cove Cockburnspath Scottish Borders
20/00188/FUL	Erection of garage/storage building	Decided	Tue 18 Feb 2020	Kinegar House Cockburnspath Scottish Borders TD13 5YH
20/00008/FUL	Erection of outbuildings and associated works	Decided	Mon 06 Jan 2020	Primrosehill 2 Crofts Road Cockburnspath Scottish Borders TD13 5YB
19/01726/AGN	Erection of general purpose storage building	Decided	Fri 06 Dec 2019	Hillfield Alpacas Hillfield Farm Cockburnspath Scottish Borders TD13 5YT
14/01186/MIN	Extension to quarry and associated works	Awaiting decision	Mon 20 Oct 2014	Glenfinn Quarry Neuk Cockburnspath Scottish Borders TD13 5YU
19/01253/S36	Variation to height of turbine T16 from 125m to 145m blade to tip	Awaiting decision	Mon 26 Aug 2019	Land North Of Nether Monynut Cottage Cockburnspath Scottish Borders
19/01253/S36	Variation to height of turbine T16 from 125m to 145m blade to tip	Awaiting decision	Mon 26 Aug 2019	Land North Of Nether Monynut Cottage Cockburnspath Scottish Borders

Application No.	Summary of Application	Status/ Decision	Application Received	Site Address
19/00963/SCR	Construction of Wind farm comprising 19 no. wind turbines and associated work- variation in height to single turbine from 125m to 145m high to tip	Decided	Mon 01 Jul 2019	Land North Of Nether Monynut Cottage (Aikengall 11a) Cockburnspath Scottish Borders
19/00066/FUL	Change of use from petrol filling station and alterations and extension to form retail with landscaping works	Decided	Thu 17 Jan 2019	Service Station Main Street Grantshouse Duns Scottish Borders TD11 3RW
18/00768/S36	Erection of 11 turbines, 4 No turbines up to 149.9m high to tip, 3 No turbines 174.5m high to tip, and 4 No turbines 200m high to tip and associated works	Decided	Wed 13 Jun 2018	Crystal Rigg Wind Farm (Phase IV) Cranshaws Duns Scottish Borders TD11 3SR
18/00590/FUL	Erection of wind turbine 14.75m height to tip and associated works	Decided	Thu 10 May 2018	Land South East Of Renton Gardens Bungalow Grantshouse Scottish Borders
17/01350/SCO	Erection of 11 turbines, 4 no turbines up to 149m high to tip, 3 no turbines 174.5m high to tip, and 4 no turbines 200m high to tip and associated works.	Awaiting decision	Thu 28 Sep 2017	Crystal Rigg Wind Farm (Phase IV) Cranshaws Duns Scottish Borders TD11 3SR
17/00627/FUL	Variation of condition 32 of planning permission 11/01464/FUL pertaining to Guidance Note 1D to enable developer to omit the free standing meteorological mast (wind data to be gathered by nacelle mounted anemometers)	Decided	Fri 28 Apr 2017	Land East Of Penmanshiel Farmhouse Grantshouse Scottish Borders
16/00980/FUL OUTSIDE OF STUDY AREA	Wind farm development comprising of 8 no turbines 100m height to tip and associated works, infrastructure, compounds, buildings and meteorological mast	Decided	Tue 09 Aug 2016	Land North Of Howpark Farmhouse Grantshouse Scottish Borders
16/00943/PPP	Erection of dwellinghouse and access	Decided	Wed 03 Aug 2016	Land South Of The Old Smiddy Cockburnspath Cockburnspath Scottish Borders
16/00791/FUL	Variation to condition 26 pertaining to planning permission 13/00615/FUL for the erection of 2 no wind turbines	Decided	Wed 29 Jun 2016	Land North West Of Shepherds House

Application No.	Summary of Application	Status/ Decision	Application Received	Site Address
				Moorhouse Coldingham Scottish Borders
16/00129/FUL	Re-instatement of quarry and formation of access track	Decided	Fri 05 Feb 2016	Land South Of Hoprig Sheil Cockburnspath Scottish Borders
15/00784/FUL	Extension to dwellinghouse incorporating roof balcony, erection of log store and triple garage with basement store	Decided	Wed 08 Jul 2015	Renton House Grants house Duns Scottish Borders TD11 3RP
14/01187/PPP	Chalet development and associated works	Decided	Wed 22 Oct 2014	Land South East Of The Beeches Howpark Grants house Scottish Borders
14/01133/FUL	Erection of dwellinghouse	Decided	Fri 03 Oct 2014	Land North East Of Stable Cottage Coldingham Loch Eyemouth Scottish Borders
14/00488/FUL	Conversion, alterations and extensions to form six dwelling houses	Decided	Fri 25 Apr 2014	Steading Buildings Old Cambus West Mains Cockburnspath Scottish Borders
14/00220/SCR	Formation of 5 No access roads	Decided	Fri 21 Feb 2014	Land North East And South West Of Fulfordlees Farmhouse Cockburnspath Scottish Borders
14/00215/FUL	Erection of dwellinghouse	Decided	Thu 20 Feb 2014	Garden Ground Of The Ramparts Cockburnspath Scottish Borders
14/00169/S36	Construction of Wind farm (Revised Scheme) comprising 19 no. wind turbines, associated access tracks, crane hardstandings, 1 no. meteorological mast, substation, construction compound and 2 no. borrow pits	Decided	Wed 12 Feb 2014	Land North Of Nether Monynut Cottage (Aikengall 11a) Cockburnspath Scottish Borders

APPENDIX 3 ZTVS



Legend:

- Preferred site boundary
- Possible building footprint
- 5km site boundary
- 2km site buffer

Zone of theoretical visibility

- Higher proportion of the proposals visible
- Lower proportion of the proposals visible

Notes:
This map contains data from the following sources:
DATA SOURCE (DATE)
Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drn	Chk	App
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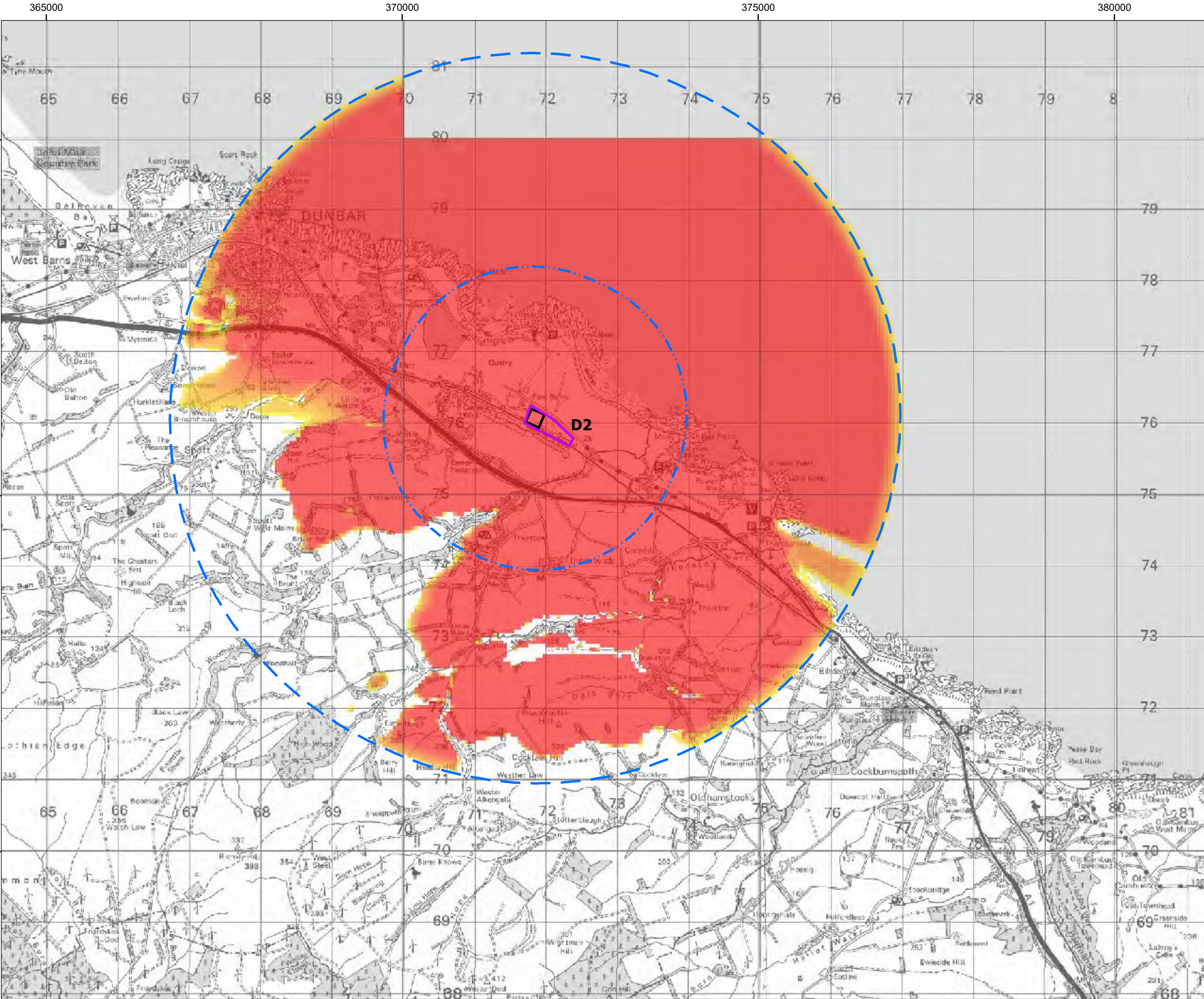
Project Title



TITLE: CD1
Zone of Theoretical Visibility

0 1 2
Kilometres
SCALE: 1:50,000 @ A3

REV 00



Legend:

- Preferred site boundary
- Possible building footprint
- 5km site buffer
- 2km site buffer

Zone of theoretical visibility

- Higher proportion of the proposals visible
- Lower proportion of the proposals visible

Notes:
This map contains data from the following sources:
DATA SOURCE (DATE)
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Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drn	Chk	App
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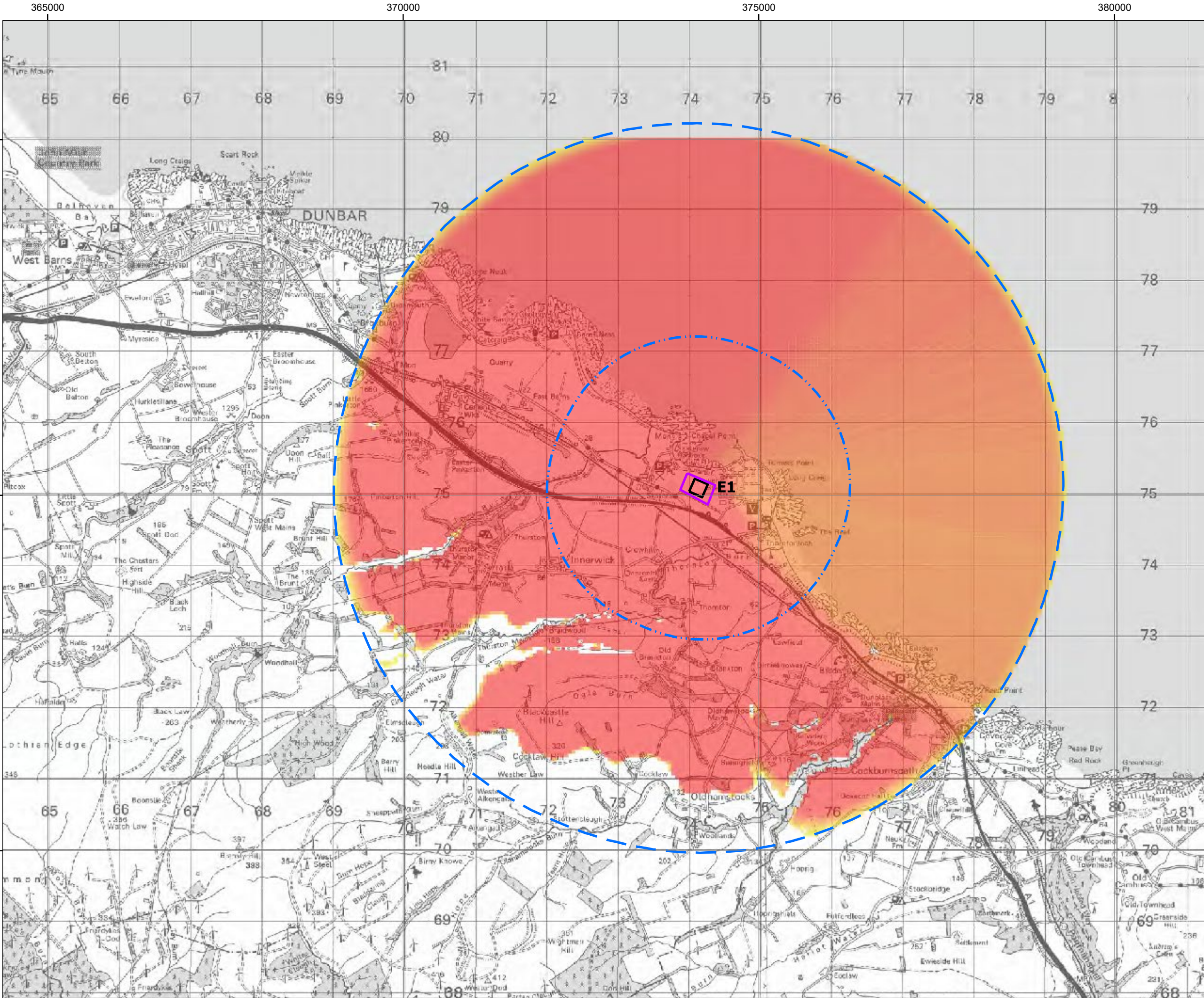
Project Title



TITLE: D2
Zone of Theoretical Visibility

SCALE: 1:50,000 @ A3

REV 00



Legend:

- Preferred site boundary
- Possible building footprint
- 5km site buffer
- 2km site buffer

Zone of theoretical visibility

- Higher proportion of the proposals visible
- Lower proportion of the proposals visible

Notes:
This map contains data from the following sources:
DATA SOURCE (DATE)
Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drn	Chk	App
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Project Title



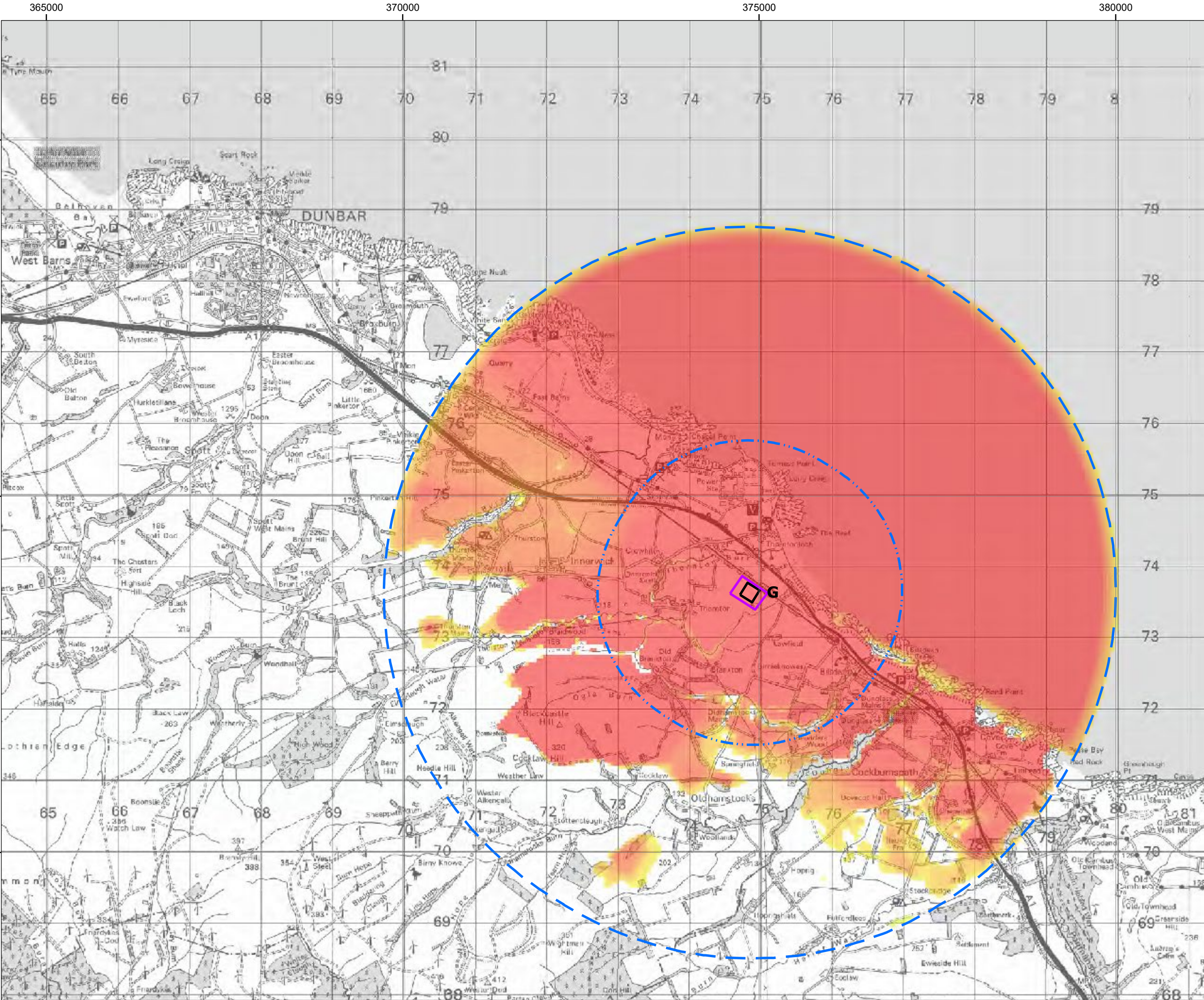
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Zone of Theoretical Visibility

012345678910

Kilometres

SCALE: 1:50,000 @ A3

REV 00



Legend:

- Preferred site boundary
- Possible building footprint
- 5km site buffer
- 2km site buffer

Zone of theoretical visibility

- Higher proportion of the proposals visible
- Lower proportion of the proposals visible

Notes:
This map contains data from the following sources:
DATA SOURCE (DATE)
Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drn	Chk	App
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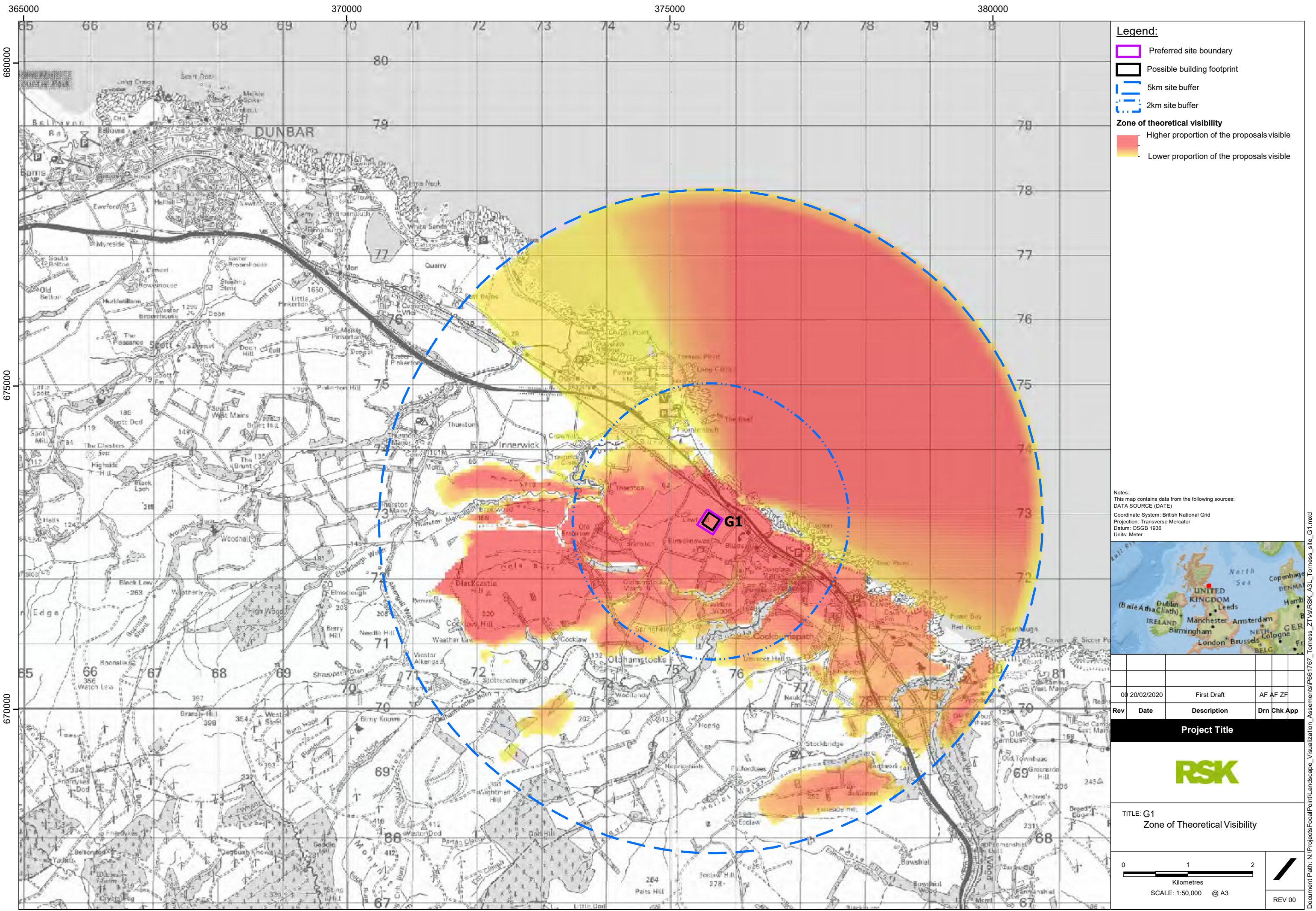
Project Title



TITLE: G
Zone of Theoretical Visibility

0 1 2
Kilometres
SCALE: 1:50,000 @ A3

REV 00



Legend:

- Preferred site boundary
- Possible building footprint
- 5km site buffer
- 2km site buffer

Zone of theoretical visibility

- Higher proportion of the proposals visible
- Lower proportion of the proposals visible

Notes:
This map contains data from the following sources:
DATA SOURCE (DATE)
Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drn	Chk	App
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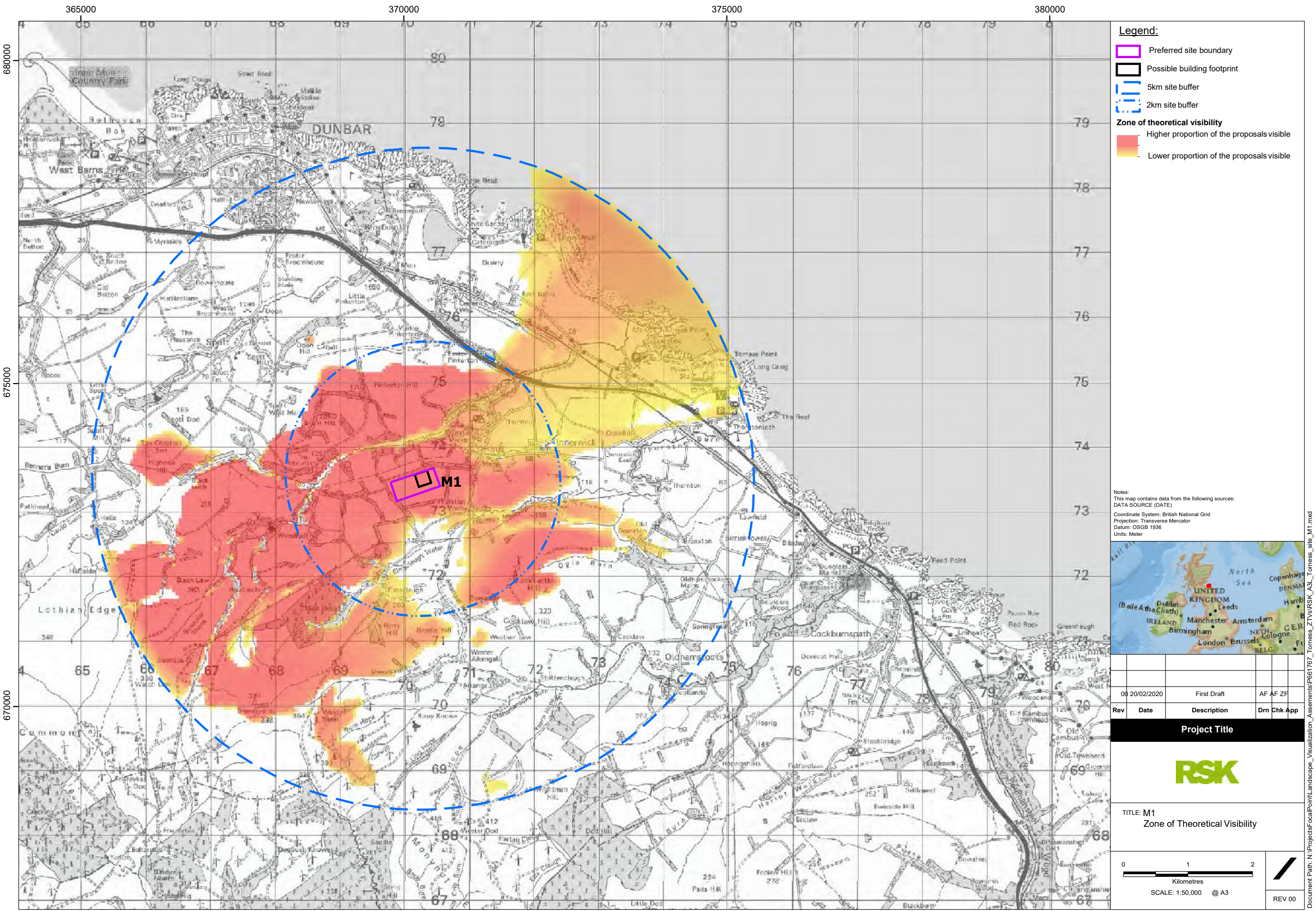
Project Title



TITLE: G1
Zone of Theoretical Visibility

0 1 2
Kilometres
SCALE: 1:50,000 @ A3

REV 00



- Legend:**
- Preferred site boundary
 - Possible building footprint
 - 5km site buffer
 - 2km site buffer
 - Zone of theoretical visibility**
 - Higher proportion of the proposals visible
 - Lower proportion of the proposals visible

Notes:
This map contains data from the following sources:
DATA SOURCE (DATE)
Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

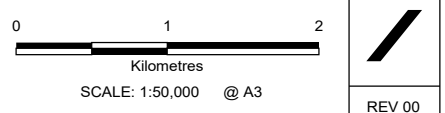


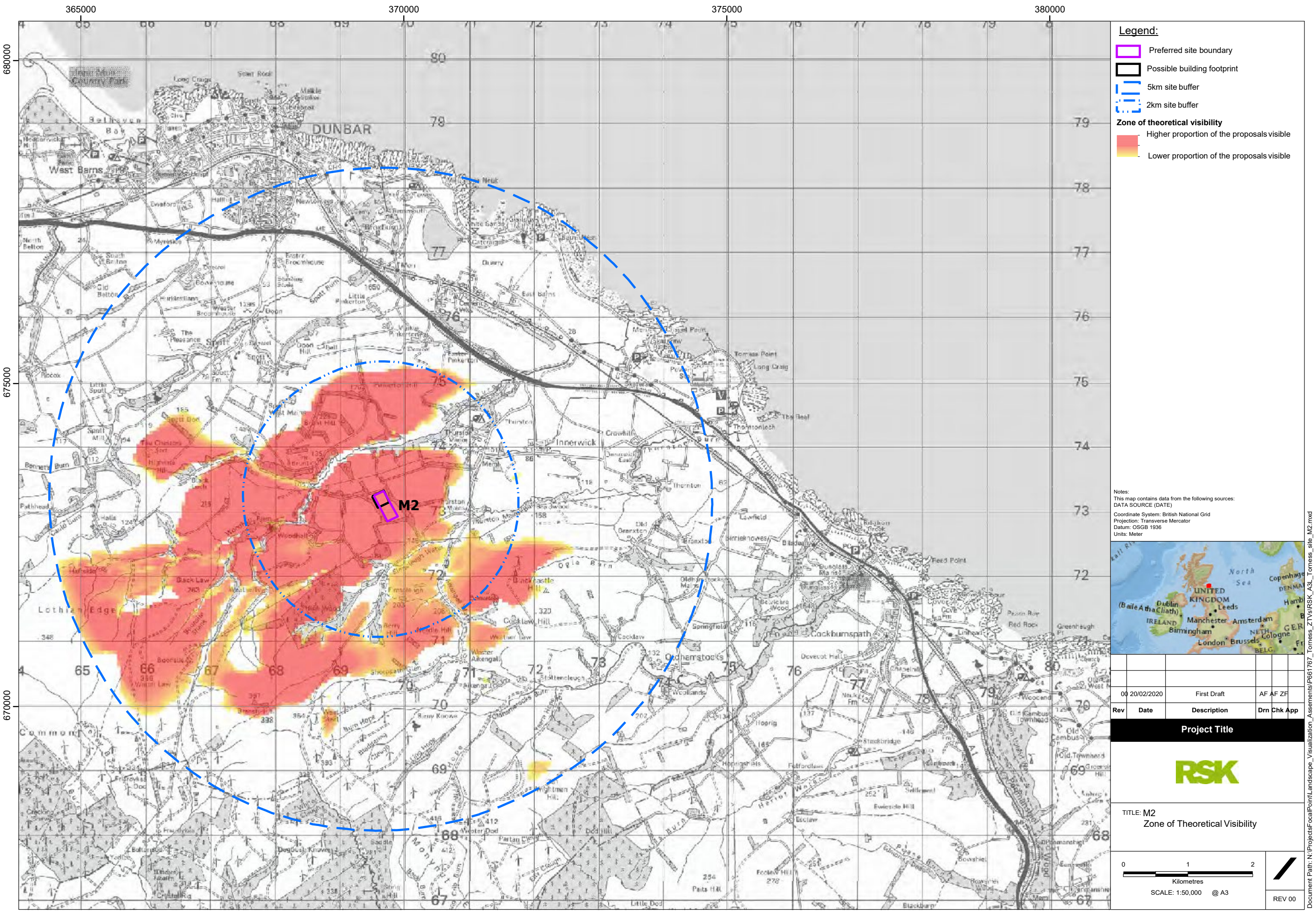
Rev	Date	Description	Drn	Chk	App
00	20/02/2020	First Draft	AF	AF	ZF

Project Title



TITLE: M1
Zone of Theoretical Visibility





- Legend:**
- Preferred site boundary
 - Possible building footprint
 - 5km site buffer
 - 2km site buffer
 - Zone of theoretical visibility**
 - Higher proportion of the proposals visible
 - Lower proportion of the proposals visible

Notes:
This map contains data from the following sources:
DATA SOURCE (DATE)
Coordinate System: British National Grid
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Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drn	Chk	App
00	20/02/2020	First Draft	AF	AF	ZF

Project Title

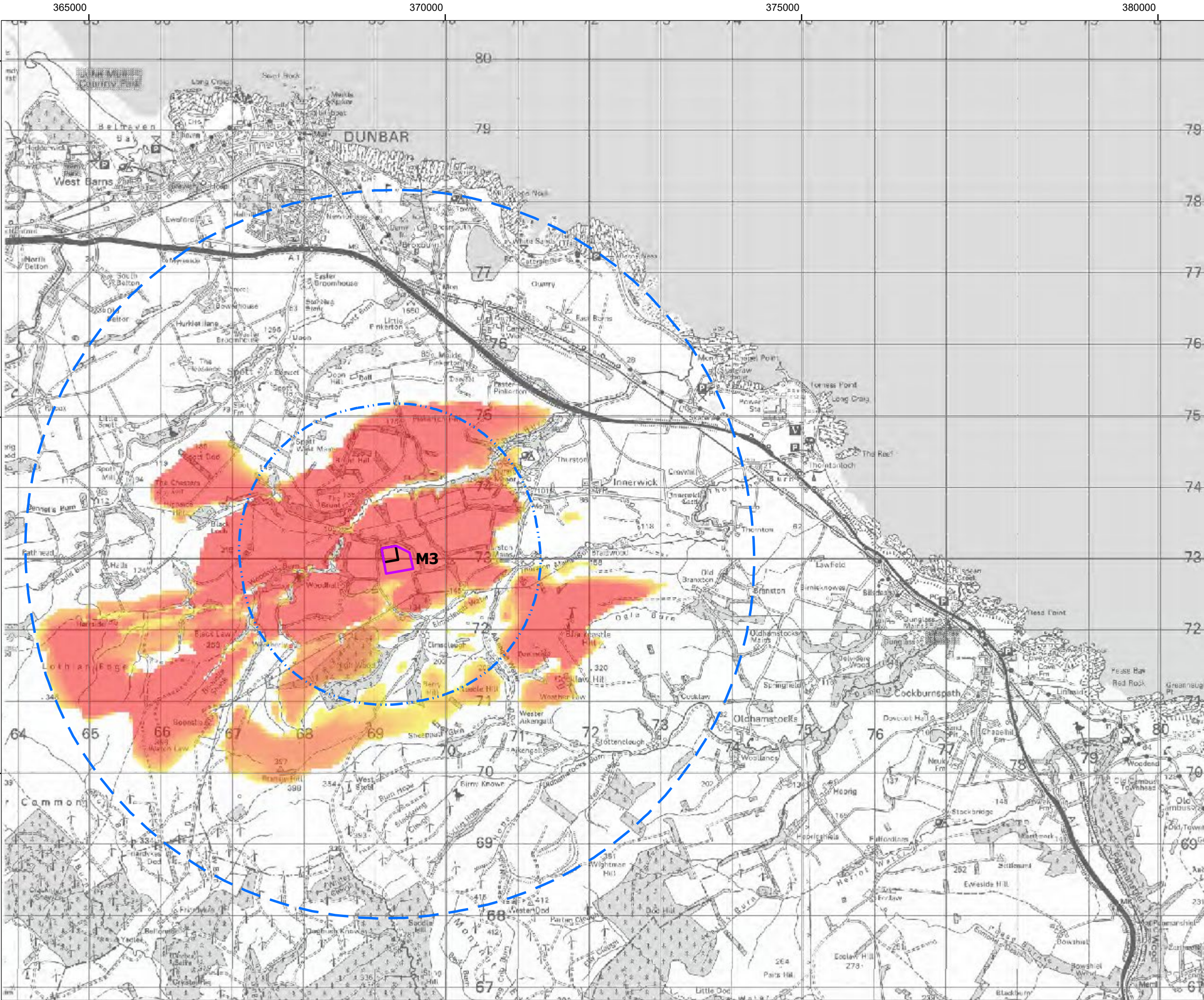


TITLE: M2
Zone of Theoretical Visibility

01 Kilometres

SCALE: 1:50,000 @ A3

REV 00



Legend:

- Preferred site boundary
- Possible building footprint
- 5km site buffer
- 2km site buffer

Zone of theoretical visibility

- Higher proportion of the proposals visible
- Lower proportion of the proposals visible

Notes:
This map contains data from the following sources:
DATA SOURCE (DATE)
Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drn	Chk	App
00	20/02/2020	First Draft	AF	AF	ZF

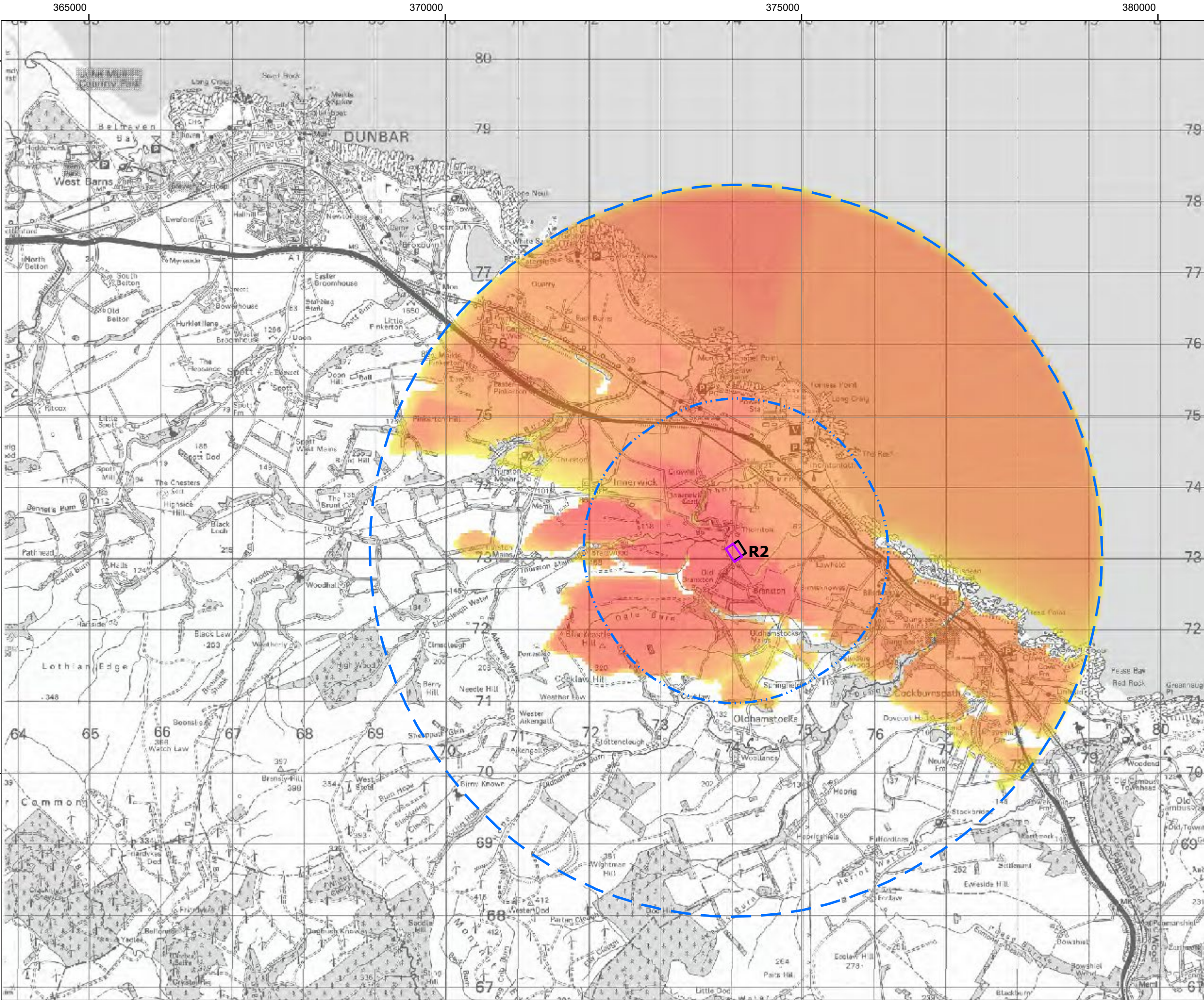
Project Title



TITLE: M3
Zone of Theoretical Visibility

0 1 2
Kilometres
SCALE: 1:50,000 @ A3

REV 00



Legend:

- Preferred site boundary
- Possible building footprint
- 5km site buffer
- 2km site buffer

Zone of theoretical visibility

- Higher proportion of the proposals visible
- Lower proportion of the proposals visible

Notes:
This map contains data from the following sources:
DATA SOURCE (DATE)
Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drn	Chk	App
00	20/02/2020	First Draft	AF	AF	ZF

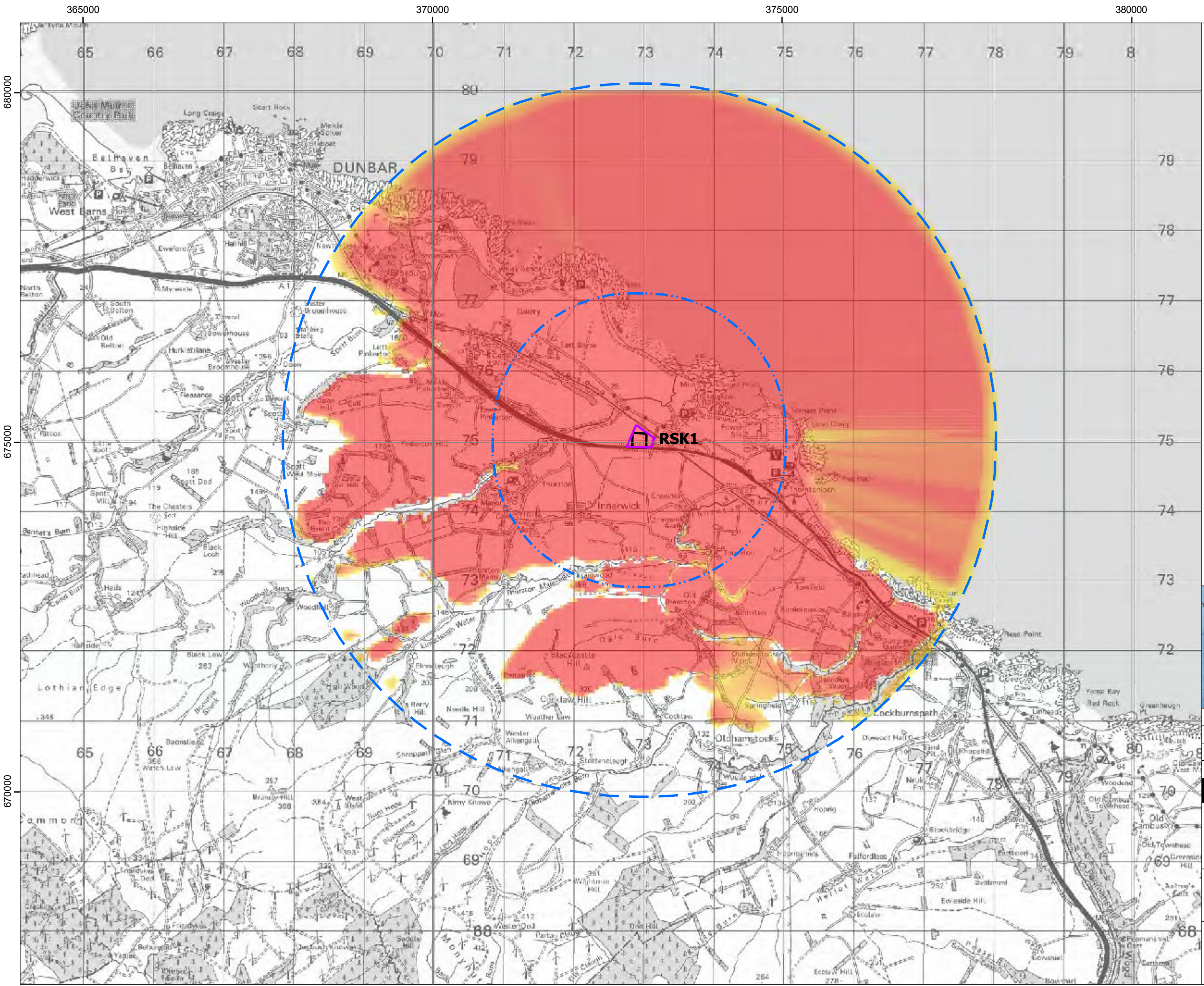
Project Title



TITLE: R2
Zone of Theoretical Visibility

SCALE: 1:50,000 @ A3

REV 00



Legend:

- Preferred site boundary
- Possible building footprint
- 5km site buffer
- 2km site buffer

Zone of theoretical visibility

- Higher proportion of the proposals visible
- Lower proportion of the proposals visible

Notes:
This map contains data from the following sources:
DATA SOURCE (DATE)
Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drn	Chk	App
00	20/02/2020	First Draft	AF	AF	ZF

Project Title



TITLE: RSK1
Zone of Theoretical Visibility

SCALE: 1:50,000 @ A3

REV 00

APPENDIX 4 LANDFALL SITE DESCRIPTIONS

Site 1 – Whitesands Bay beach

This site was visited on 24th October 2019 by RSK personnel.

Intertidal and coastal area

Whitesands bay is a wide sandy beach that curves around the bay, with a north easterly aspect. The sand is firm and clean. The beach is generally flat with low sand dunes and grassland backing the beach. The gradient of the beach increases on the upper shore and there is a low ridge to cross into the dunes behind the beach. Patches of rock and shingle are also present, mostly in the centre of the beach, and drift algae is abundant. The southern end of the beach is backed by a rocky headland, and a small farmhouse is present. The northern end of the bay is characterised by rock and boulder scar ground, which extends northwards along the coast. A flooded quarry is situated inland from the beach, whilst there is a small car park and toilets at the back of the beach and a golf course present between the beach and the main road. The golf course extends southwards to the northern and central parts of the bay behind the beach and dunes.

Several wading birds were observed at the site, including curlew (*Numenius arquata*), eider (*Somateria mollissima*), scoter (*Melanitta nigra*), turnstone (*Arenaria interpres*) and oystercatchers (*Haematopus ostralegus*). The site is within Barns Ness Coast SSSI (see Section 3.10.1).

Nearshore area

Offshore from the beach there is a large area of rock scar with waves breaking over it (particularly at the northern end of the beach). It is likely that rock is present below the seabed sediments. There is sublittoral rock habitat and reef present up to 1.5 nautical miles from the shore, then subtidal soft and gravelly/rocky sediments mixed with subtidal rocky reef between 1.5 and 2 nautical miles offshore (DEFRA, 2019). There is a wreck present at approximately 24 m water depth just outside the bay itself close to the Ruddystone Reef. The site overlaps with the offshore Outer Firth of Forth and St Andrews Bay Complex SPA (see Section 3.10.1), thus species associated with this site are to be expected.

Site 2 – Barns Ness

This site was visited on 24th October 2019 by RSK personnel.

Intertidal and coastal area

This site is a medium-gradient sandy beach, backed by moderate-height dunes and a lighthouse built on an area of bedrock and boulder scar with a lighthouse at the northern end of the beach. The sand is clean and fine, and an abundance of drift seaweed is present. A hilly mound is present inland, grassland backs the dunes through which a public footpath provides access to the beach from a car park. The car park for Barns Ness is accessed via the same road as Whitesands Bay. An access road is also present for the lighthouse from the car park. As with most of the bays visited within the Study Area, the parking areas had information boards describing the key ecological and historical information about the area. The beach is relatively long and exposed and linear

in a north – south orientation, which gradually curves to a more North west – south east direction with increased distance to the south. The beach generally has an aspect towards the east and north east. At the northern end of the beach where the Barns Ness lighthouse is present the beach is dominated by boulders and shingle, with exposed intertidal bedrock and boulder scar. This extends into the subtidal. With increased distance to the south the beach becomes sandier, and the intertidal / subtidal rock is diminished. The beach extends to a low rocky point at the southern extent, which separates it from Skateraw Harbour.

The site is within the Barns Ness Coast SSSI (Section 3.10.1), thus species associated with this site are expected. Wading birds were observed on the beach itself. This beach had an abundance of washed up molluscs shells along the high tide mark.

Nearshore area

Offshore from the beach the seabed sediments consist of sublittoral rock and reef to 1.5 nautical miles offshore. Seabed sediments consist of mixed gravel, cobbles and soft sediment from 1.5 to 2 nautical miles. There is a wreck present at approximately 24 m water depth off the coastline close to the Ruddystone Reef (approximately 350 m to the south east of the reef itself).

The site overlaps with the offshore Outer Firth of Forth and St Andrews Bay Complex SPA (see Section 3.10.1), thus species associated with this site are expected.

Site 3 – Thorntonloch beach

This site was visited on 23rd October 2019 by RSK personnel.

Intertidal and coastal area

This site consists of a wide sandy beach backed by dunes, with fine, clean sand, with a large area of intertidal bedrock and boulder scar at the northern end of the bay under Torness Point. This extends subtidally. The Thornton Burn freshwater stream flows out across the beach at the centre of the bay. Torness Nuclear Power Station is situated at the northern end of the beach on Torness Point and the Thornton Loch caravan park is immediately to the south of this behind the beach and dunes. Extensive sea defences protect the power station, while small concrete sea walls at the top of the beach separate the beach from the caravan park. Incorporated into the sea defences on Torness Point are the cooling water discharges from the power station. This discharge runs through a channel in the bedrock scar. The publicly accessible John Muir Link coastal path runs adjacent to the beach and around the perimeter of the power station, while the A1 main road runs inland parallel to the railway. Thorntonloch is a small hamlet with a few houses and a small hotel as well as the caravan park. A public car park is behind the caravan park with a footpath access to the north of the caravan park to the beach.

The geology of the site consists of Carboniferous sedimentary rocks, typical of the Ballagan and Aberlady formations. Two natural arches in the sandstone headland at the southern end of the beach are reported to be present, and interesting features of weathering along the rocky shore (Whitbread et al., 2014b). At this southern end of the beach the cliffs become considerably steeper than the majority of the Thorntonloch beach. A small cove was also investigated during the site visits (described in Section 4.1.6 below)

The Thorntonloch site is popular with recreational users, including surfers, walkers and shoreline fishers. Shoreline fishing in particular was observed in the vicinity of the power station cooling water discharge on Torness Point.

The beach at Thorntonloch generally consists of relatively flat sandy habitat with a low diversity of species, mainly opportunistic and pioneer invertebrates such as amphipods, *Scolecopsis spp.* and *Eurydice pulchra*, typical for a mobile clean area (Mainstream Renewable Power, 2012). However, the outcrops of bedrock and boulders (especially at the north of the beach) do support a more diverse rocky shore floral and faunal assemblage that in turn support shoreline birds such as oystercatchers, which were observed during the site visit. Bedrock habitat present supports *Porphyra purpurea* and *Enteromorpha spp.* and *Rhodothamniella floridula*, whilst the rock features provide habitat for the copepod (*Tigriopus fulvus*) and a shelter for fish fry (Mainstream Renewable Power, 2012).

Lobster and keel worms can also be found within the cobbles and pebbles, and wading birds feed on the enriched area surrounding the Thornton Burn stream (Mainstream Renewable Power, 2012). The site is subject to significant disturbance from recreational users, thus habitat quality is compromised (Mainstream Renewable Power, 2012). The intertidal rock and boulder shoreline supports typical furoid dominated rocky shoreline, while the beach itself is dominated by clean, fairly mobile sand (Mainstream Renewable Power, 2012).

The intertidal area of the site is not within any designated areas, however is close to Pease Bay SSSI to the south, while the Barns Ness Coast SSSI extends southwards to just to the north of Torness Nuclear Power Station to the north (East Lothian Council, 2019).

Nearshore area

Offshore from the beach, sediments consist of a mix of subtidal rocky reef (carboniferous limestone) and kelp beds up to 1.7 nautical miles offshore, then a mix of gravels and cobbles to 2 nautical miles. Water quality in the nearshore area was recorded as 'excellent' in the Scottish Environment Protection Agency's bathing water quality surveys (Mainline renewables, 2012). Within the bay itself the sandy seabed can be seen to extend offshore, however this may be a relatively thin veneer of sediments. The bedrock scar / platform in the north of the bay was seen to extend subtidally in a south and south east direction just offshore from the beach itself in shallow water.

Previous surveys in the nearshore waters of the Study Area identified almost thirty seabird species and several species of marine mammals). Furthermore, the nearshore area overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA, thus birds associated with this site would be expected (Mainstream Renewable Power (2012).

Site 4 – Skateraw Harbour

This site was visited on 23rd and 24th October 2019 by RSK personnel.

Intertidal and coastal area

This site is a small sheltered, shelving beach protected by a bedrock and boulder point to the north and the Torness Nuclear Power Station to the south. The point to the north extends subtidally to form a reef offshore that further protects the bay. The main cooling

water intakes for the power station are present on the southern shore of the bay and are characterised by relatively fast water movements in this area.

The beach itself is backed by a car park and visitor facilities and an area of grass sward. Access is down a small road that leads from the village of Skateraw itself. The southern part of the bay is rocky with boulders and a bedrock platform, which extends towards the power station itself. The southern shoreline of the bay is dominated by the power station and a large breakwater which extends from the southern point of the bay to provide further protection to the vessel moorings and the dock facilities. Large mooring dolphins are present, as well as navigational lights suggesting that larger vessels are occasionally required to dock.

The centre of the beach consists of mainly firm sand and backed by softer sand and dunes. Many shoreline birds are present, and drift algae is extensive. A house is present at the north side of the beach. The bay has a much more sheltered aspect than many of the other sites visited due to the reef to the north (which was being used by surfers) and the breakwater to the south.

Signage at the site indicates the presence of Torness lime kiln, which is of historical importance and a Category B listed building since 1989 (EDF Energy, 2019). There was also notices describing the former presence of a WW1 era airfield, which was used as part of the defence of Edinburgh and the Firth of Forth naval facilities.

Dune habitat at the back of the beach was dominated by some areas of sand dune habitat and species-poor grassland. Species such as sea sandwort (*Honckenia peploides*), sea kale (*Crambe maritima*), frosted orache (*Atriplex laciniata*) and spear-leaved orache (*Atriplex patula*) were observed in previous surveys of the site (Wardell Armstrong, 2014). Signage at the site also indicates the presence of skylark (*Alauda arvensis*) and meadow pipits (*Anthus pratensis*) that nest in the coastal grassland (EDF Energy, 2019), several butterflies and some migrating birds such as snow bunting (*Plectrophenax nivalis*) and barred warbler (*Sylvia nisoria*) are also understood to be present. Wading birds are also attracted to the intertidal area, including oystercatchers (*Haematopus ostralegus*), redshank (*Tringa totanus*), curlew (*Numenius arquata*) and dunlin (*Calidris alpina*) (EDF Energy, 2019).

The beach itself is a crescent of sand, with an extensive strandline due to the levels of drift algae on the beach. A number of wading birds were observed feeding along the shoreline. The northern shoreline of the bay was dominated by an extensive area of boulder and bedrock intertidal area, which extends out to a headland that separates the bay from the beach leading along to Barns Ness. Typical rocky shore communities were present on the intertidal shorelines in the north and south of the bay. The intertidal rocky shorelines on both the southern and northern shorelines of the bay extend significantly subtidally. The beach itself is relatively narrow (approximately 200m in length).

Nearshore area

The nearshore waters are understood to attract sea ducks such as eider (*Somateria mollissima*), red-breasted merganser (*Mergus serrator*) and gannets (*Morus bassanus*), that come from nearby Bass rock to fish (EDF Energy 2019).

The bay itself is relatively sheltered and enclosed due to the breakwater and the offshore reef.

Previous surveys in the nearshore waters of the Study Area identified almost thirty seabird species and several species of marine mammals. Furthermore, the nearshore area overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA, thus birds associated with this site would be expected) (Mainstream Renewable Power (2012).

Skateraw Harbour is largely within the Barns Ness Coast SSSI, which covers much of the shoreline and shallow subtidal area, as far as the boundary of the power station.

Additional site 1 – Inlet south of Thorntonloch

This site was visited on 24th October 2019 by RSK personnel.

This site consists of a small beach south of the main Thorntonloch beach, backed by cliffs. The coastal relief at the southern end of Thorntonloch rises fairly significantly resulting in cliffs of approximately 30m in height. A small beach is present at the base of the cliffs, however there is no access to the beach from above due to the steep eroding cliffs. The site was observed via a farm track directly off the main A1 road. The beach appears to be clean sand, however it is not clear how much beach is present at high tidal states. When observed at a fairly low state of tide, the intertidal beach area was relatively narrow. The beach is surrounded to both the north and south by areas of intertidal rock and extensive coastal cliff formations.

Additional site 2 – Cove Harbour

This site was visited on 24th October 2019 by RSK personnel.

This site is a small fishing harbour with a strip of beach, surrounded by steep limestone cliffs of 30-40 m. The village of Cove sits atop the cliffs, with a public walkway cutting down through an extensive tunnel system. A brook also runs down the cliffs to the beach.

The site is of cultural and historical importance, with listed buildings and Cove hamlet being an example of an east coast 'heugh' held village.

The harbour itself is owned and managed by Cove Conservation Ltd. The site has been used as a natural harbour since the 1600s. During the 1700s, the extensive tunnel systems were built to provide a path for fishermen down through the cliffs, which were also used to store fish and smuggled goods. The current harbour and associated listed buildings were completed in 1831. Above the harbour itself at the top of the cliffs is the village of Cove, which has housed fishing families for hundreds of years. There is also a memorial slab present, commemorating the 'Black Friday' fishing disaster of 1881 in which many fishermen were lost during a storm.

The carboniferous strata, range of rock types, rich marine fossil fauna and tropical plant fossil spores also make the site of geological interest.

The site is within Pease Bay Coast SSSI, designated for its interesting fauna and flora, and cliff-top maritime communities (Aberdeen City Council, 2015). The Cove marine bands are also of geological interest as an excellent example of Carboniferous strata and are observed in the cliffs here (Scottish Natural Heritage, 2019b).

Additional site 3 – Pease Bay

This site was visited on 24th October 2019 by RSK personnel.

This site is moderately-shelving sandy beach in an east/north-east facing bay, backed by approx. 40 m sandstone and limestone cliffs and at the northern and southern ends and

inland. The area of flat lower land behind the beach is taken up almost entirely by a large caravan park. Access to the site is via the coastal road, which serves the caravan park, although public parking is also available. Two rivers/ streams flow out across the beach, the Cockburnspath Burn and the Tower Burn. The beach has a relatively extensive strandline and there is a lot of drift algae present on the shoreline. The beach is popular with surfers.

Signage close to the car park highlights the site's historical importance, such as the Redheugh coastguard cottages atop the cliffs, famous for bringing an end to smuggling through a new style of coastguard watch. Siccar point, just to the south east of Pease Bay, is notable for James Hutton's boat trip in 1788, during which important geological observations were made (East Lothian Council, 2019). There are also several bronze trail markers, created by artist John Behm to commemorate the Black Friday fishing disaster of 1881 (East Lothian Council, 2019).

Signage also indicates the site's ecological importance, as it is partly within Pease Bay Coast SSSI, thus species and communities associated with this site are expected (East Lothian Council, 2019). The SSSI boundary extends northwards from the northern part of the bay itself. As such much of the beach is outside the SSSI boundary. The bay is managed as a nature reserve by the Scottish Wildlife Trust (Wardell Armstrong, 2014).

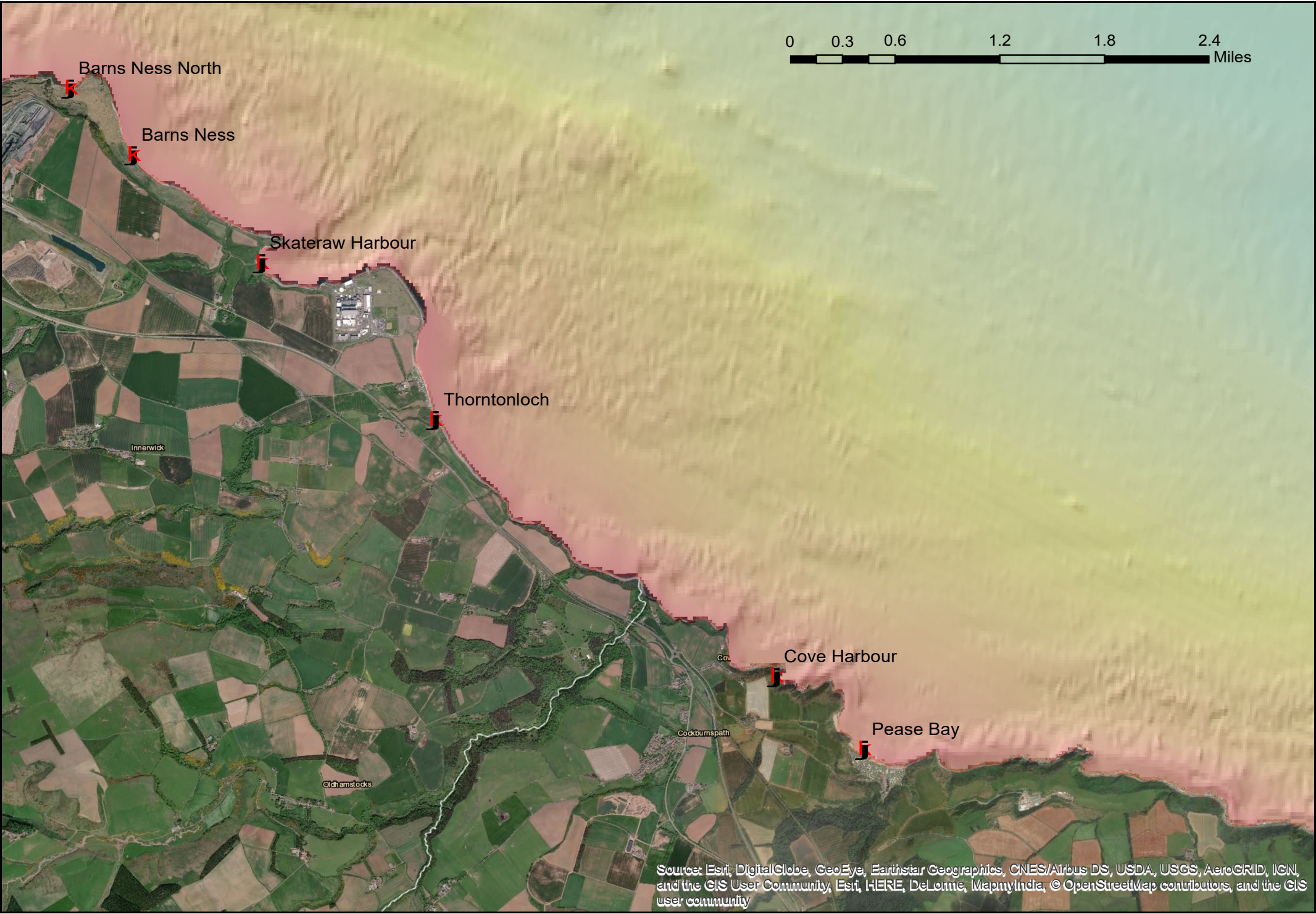
Additional site 4 – Barns Ness north

This site was visited on 24th October 2019 by RSK personnel.

The site consists of a small beach largely composed of shingles and cobbles, with much drift algae present and sand dune and grassland behind. The beach is in a relatively enclosed north facing bay, with an access road to Barns Ness lighthouse running adjacent. There is also a small car park, accessed via the same road as for Whitesands beach to the north. The beach itself is within a small bay that is very enclosed by curving intertidal and subtidal reefs that extend from both peripheries. The rock scar, which is both bedrock and boulder can be seen to extend extensively subtidally to the north, meaning that the sandy subtidal elements in the bay form a relatively narrow strip, which are almost entirely enclosed by subtidal rock.

The site is within the Barns Ness Coast SSSI, thus species associated with this site are expected.

APPENDIX 5 NEARSHORE SATELLITE IMAGERY



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

0 0.1 0.2 0.4 0.6 0.8 Miles

Barns Ness North

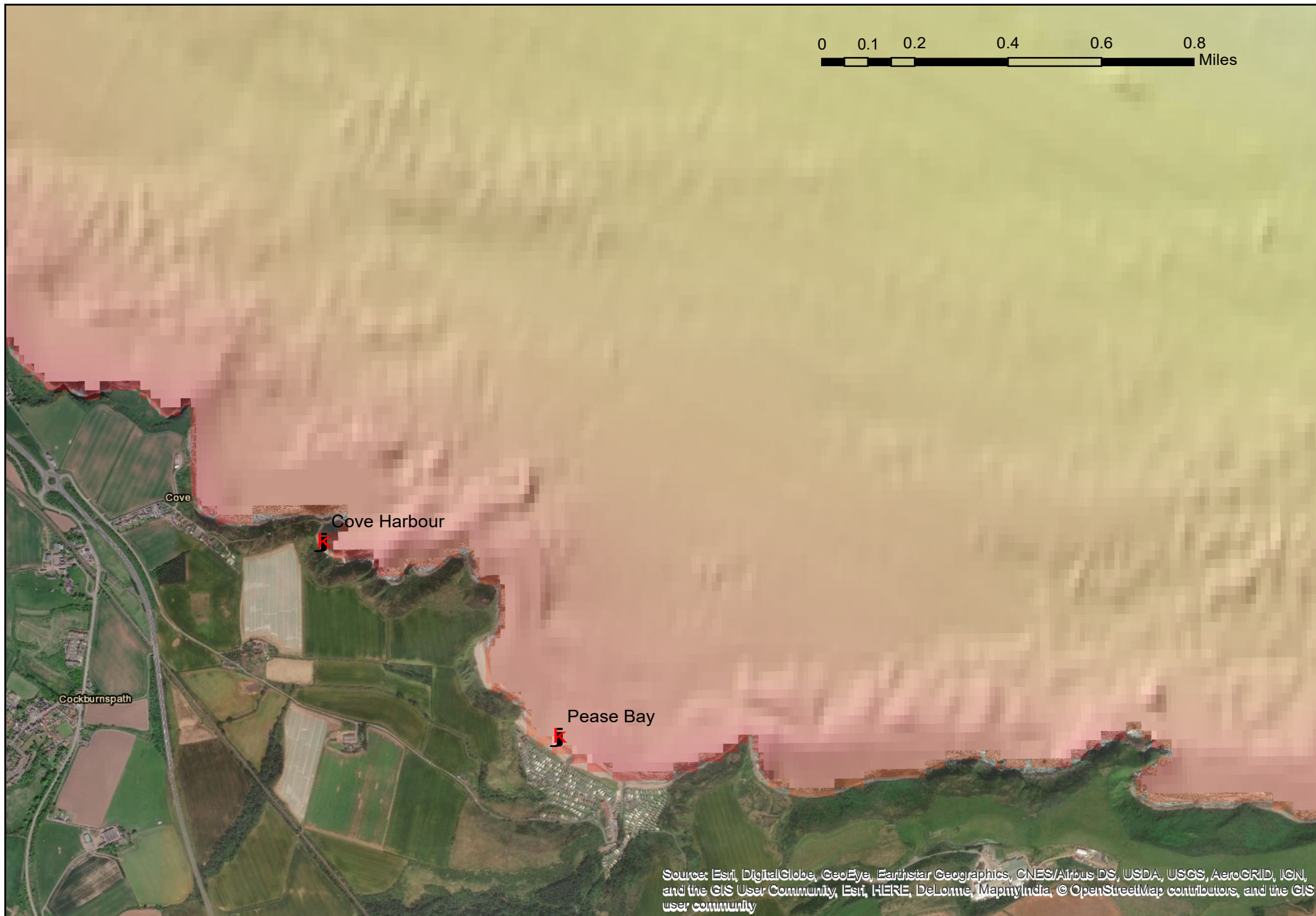
Barns Ness

Skateraw Harbour

Skateraw

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

0 0.1 0.2 0.4 0.6 0.8 Miles



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APPENDIX 6 CONSULTATION RESPONSES

Appendix 6: Summary of Key Consultation Responses

Date	Type	Consultee	Summary of Issues Raised	How Issues Addressed
Project Briefing (online meeting)				
18 June 2020	Feedback during project briefing	Scottish Natural Heritage (SNH), Historic Environment Scotland (HES) and Scottish Environmental Protection Agency (SEPA)	SEPA raised a query about potential for radioactive particles in sites in the vicinity of Torness Power Station and whether this would be given consideration in terms of siting/routing.	Sites E1 and E2 in the vicinity of the Torness Power Station were excluded from the shortlisted sites as part of the options appraisal process. The specific issue of radioactive particles did not form part of the appraisal criteria.
23 June 2020	Feedback during project briefing	East Lothian Council (ELC)	ELC noted that they would be keen to get involved in the options appraisal process as early as possible. Key contacts on project would be the Council's landscape team and policy team (re EIA screening etc).	An options appraisal workshop was organised to present the approach and initial site options identified. Ongoing consultation is proposed as part of the project.
			ELC are keen that there are joint discussions with the SSER Berwick Bank (previously Seagreen 2) project.	A combined meeting with SP Energy Networks and SSE Renewables and ELC was organised to discuss project interactions. Ongoing liaison between SP Energy Networks and SSE Renewables is underway as part of the project. SP Energy Networks and SSE Renewables are sharing relevant project information

Date	Type	Consultee	Summary of Issues Raised	How Issues Addressed
				including potential locations of electrical infrastructure (cable corridors and substation options); this information was considered as part of the engineering component of the options appraisal.
Options Appraisal Workshop (online meeting)				
23 July 2020	Feedback during workshop	East Lothian Council	ELC note the need to consider the potential capacity for future expansion of a site.	Capacity for future expansion has been considered in general terms as part of the appraisal, i.e. sites that are currently constrained by space for the proposed development are unlikely to allow for future expansion and are therefore not preferred.
			ELC note that the M sites have the potential to spread development down the road and closer to areas where people are living.	The appraisal process has considered proximity of residential receptors to site options. In addition, the M sites are considered to offer much better screened from people than those on the open coastal fringes, and there is potential for better topographical containment.
			ELC note that land in the vicinity of Oxwell Mains even though in Battlefield Inventory, has already accommodated large buildings; ELC wouldn't necessarily agree that these sites should be discounted.	The appraisal process has considered a range of factors, including landscape setting and capacity, environmental concerns and technical and practical considerations. Although sites within the Battlefield Inventory have been

Date	Type	Consultee	Summary of Issues Raised	How Issues Addressed
				<p>developed, significant landscape features identified including the Brox Burn, Doon Hill and the grounds of Broxmouth House survive intact and are well preserved. The spatial and topographic relationships between these features played key roles in the Second Battle of Dunbar and their preservation allows the landscape of the battlefield to continue to be read and understood. Important views such as those looking from the summit of Doon Hill towards Broxmouth House and Dunbar in the north are intact and provide the same outlook as would have occurred in the 17th century.</p> <p>Effects on views from the south across open coast also need to be considered. Whilst there is development here already it does not necessarily that further development should follow. It is noted that restoration has further developed the recreational interest of the area,</p> <p>As detailed in the options appraisal report, a number of the initial site options in the vicinity of Oxwellmains are restricted by existing development and minerals safeguarding. Technical issues include multiple crossings of the required</p>

Date	Type	Consultee	Summary of Issues Raised	How Issues Addressed
				AC cable connection by existing SPT cables and NnG cables.
27 August 2020	Email: feedback following Options Appraisal Workshop	East Lothian Council	ELC note the need to consider the best fit for the proposed development sites that will allow for topographical containment as a first priority rather than relying on screening from trees.	<p>The comment on the need to integrate the permanent elements of the development into the landscape setting including the use of topographical containment where possible is noted. It is SPENs intention to avoid large-scale earthworks where possible however careful use/consideration of the existing topography and some earth modelling (eg levelling/tiering) where required would be envisaged.</p> <p>Existing topography and potential for containment has been considered as part of the appraisal process.</p> <p>The preferred M2 site offers the greatest potential for topographic containment of the site options considered.</p>
			To enhance existing green networks ELC require that all new planting to integrate/screen and mitigate for trees lost to development are designed to physically link with existing areas of shelterbelts, woodlands and hedgerows.	<p>The need to consider enhancement of planting/new planting for landscape screening for permanent above ground infrastructure and the need for linkage with existing green networks is noted.</p> <p>The preferred M2 site offers the greatest potential for integration of landscape</p>

Date	Type	Consultee	Summary of Issues Raised	How Issues Addressed
				mitigation planting with existing shelterbelts, woodland and hedgerows.
			ELC comment that a preferred location for landfall would be – Skateraw or Thorntonloch – as this would avoid disturbing more sensitive sections of the SSSI coastline north from Skateraw.	The presence of designated coastal SSSI sites has been considered as part of the options appraisal. Thorntonloch has been identified as the preferred landfall option (located outside of the SSSI designation).
			ELC comment that CD1 and CD3 would require access from the Whitesands / Barns Ness coast, which should be avoided. Converter station building would relate well to the concrete works plant to the east.	Thorntonloch has been identified as the preferred landfall option (located outside of the SSSI designation) with the substation connection at Branxton adjacent to the existing electrical infrastructure (sealing end compound). The short-listed site CD1 is some distance from the preferred landfall and substation connection point. In comparison with the preferred M site, CD1 does not offer the ability to combine the AC and DC cable corridors, and would require a longer AC cable to the substation connection point. It is agreed that a building at CD1 would be viewed within the context of the adjacent cement works
			ELC suggest that the preferred location for converter building would be E1 (minimises impact of scale of 30m high converter	The comments on individual sites are noted.

Date	Type	Consultee	Summary of Issues Raised	How Issues Addressed
			<p>building by reading with Torness). Possible location for converter building – G or RSK1. L2 highly visible from the coast on the exposed hillslope. CD2 and C are already developed/proposed for development. D1 and D2 are part of the quarry.</p>	<p>It is agreed that visual impact of a new converter station development at E1 would be reduced due to the presence of Torness power station. However, we also note that the development would still be highly visible within the landscape and the power station is due to be decommissioned, which would potentially leave the development without the context of the power station.</p> <p>The comment on Site L2 being highly visible is agreed; this site was identified as 'least preferred' for a converter station site from a landscape and visual perspective.</p> <p>It is noted that CD2 and C are already developed/proposed for development, and D1 and D2 are part of the quarry.</p> <p>The options appraisal report presents the findings of the comparison of site options based on consideration of environmental, technical and economic aspects.</p>
			<p>ELC note that a converter station building at E1 would relate well to Torness Power Station to the north east.</p>	<p>The options appraisal identified that E1 being located immediately adjacent to Torness Power Station would provide some visual cohesion with existing industrial structures. However, it was also identified that the site is exposed and</p>

Date	Type	Consultee	Summary of Issues Raised	How Issues Addressed
				would be perceptible from a wide area. In addition, Torness Power Station is currently scheduled to be decommissioned in 2030.
			ELC comment that Sites M1, M2 and M3 would require long cable runs and related landscape impact. Topographical containment would be key to the successful integration on the M sites.	Potential environmental impacts from different cable routes are considered a part of the options appraisal. It was identified that the screening afforded by landform and woodland for Sites M2 and M3 is likely to limit adverse landscape and visual effects. In contrast, the lack of existing screening at other sites, including the G and G1 sites, and the more exposed location of these sites means they are less preferred.
			ELC comment that the M sites are also located within the Eastern Lammermuirs Upland Fringe landscape character area, whereas all the other proposals are within the Innerwick Coastal Margin. Locating buildings in these locations would therefore not be supported.	The M sites would require a longer cable length and greater landscape works than sites closer to the coastline. However, the likely impacts on the landscape from the cable would be short-term, temporary and not significant. Once the cables had been laid there would be landscape reinstatement/ remediation works e.g. any hedgerows lifted in order to bury the cables would be reinstated. As a result of the landscape reinstatement works and mitigation measures, long-term

Date	Type	Consultee	Summary of Issues Raised	How Issues Addressed
				<p>residual LVIA impacts from the cable would not be significant.</p> <p>LVIA effects will occur during the construction of the proposed converter station, substation and cable route, however operational impacts will only be associated with the permanent above-ground elements (proposed converter and substation) of the development.</p> <p>NatureScot (SNH) published an updated landscape character assessment for the whole of Scotland in 2019 and RSK have referred to these LCT over older local character assessments, except for locally designated Special Landscape Areas (SLA) which have been referenced.</p> <p>With respect to the SLAs, we note that the M sites are located in an area which is not classified as a SLA by ELC.</p> <p>Based on the initial landscape character assessments, the appraisal considers that the M sites are not 'valued' or 'protected' landscapes and would not be considered as such within a full landscape assessment for EIA, based</p>

Date	Type	Consultee	Summary of Issues Raised	How Issues Addressed
				upon current national and local landscape designations.
			ELC comment that at Sites G and G1 the siting of the buildings on the lower contours would help provide better containment.	Given the scale of the proposed converter station size, both G and G1 were identified as being exposed sites where the introduction of a large converter building would noticeably alter the landscape.
			ELC comment that keeping all the access and buildings to the southeast will help to minimise the impact on the wider landscape and contains development in a smaller area, allowing the area to the north and west to be retained for recreation. This will become more important once the quarrying works are complete and the land is reinstated.	While the principle of containment within a smaller area may minimise landscape effects, in this case, the area north of the study area is occupier by a cement works and a new Energy from Waste Facility.
			ELC comment that substation site options R1 and R2 would retain a substation within a dip in landform with the sites also providing a direct link into the existing overhead electricity cables.	Noted. Existing topography and potential for containment has been considered as part of the appraisal process.
Options Appraisal Consultation				

Date	Type	Consultee	Summary of Issues Raised	How Issues Addressed
11 August 2020	Email: feedback on Options Appraisal Consultation	Historic Environment Scotland (HES)	Although the site options avoid direct impacts on scheduled monuments, there is still potential for setting impacts and these should play a part in the site selection process.	The potential for direct effects on heritage assets, as a result of likely impacts on the setting of heritage assets from the proposed development have been considered as part of the appraisal process.
			HES note that a number of the sites are within the Battlefield Inventory (Battle of Dunbar II); Site CD1 is in an area that has possibly seen the least disturbance. Consideration of development on this site should be based on a thoroughly researched understanding of the battle and past land use.	Consideration has been given to sites located within Battlefield Inventory boundaries as part of the appraisal process.
16 October 2020	Email: feedback on Options Appraisal Consultation	NatureScot	<p>Agree that CD1 is of low biodiversity value, but note the presence of the adjacent Whitesands Nature Reserve which, although undesignated is managed for nature.</p> <p>Note that E1 would require careful planning to avoid impacts on the adjacent Barns Ness Coast SSSI. A narrow strip of sand dune (a designated feature) runs along the coastline, and the intertidal rock forms part of a designated geodiversity feature.</p>	<p>The presence of Whitesand Nature Reserve is considered within the appraisal process.</p> <p>The presence of designated coastal SSSI sites has been considered as part of the options appraisal.</p>

Date	Type	Consultee	Summary of Issues Raised	How Issues Addressed
			<p>Agree that M1/M2 location is of low biodiversity value but note the presence of ancient woodland which should be protected from impacts.</p> <p>Note that M3 is within 500m of Woodhall Dean SSSI – if this location is selected then the project would need to avoid impacts on the SSSI. Also note the presence of ancient woodland which should be protected from impacts.</p>	<p>The presence of ancient woodland has been considered as part of the options appraisal.</p> <p>The location of Woodhall Dean SSSI has been considered as part of the options appraisal.</p>
Joint Meeting Eastern Link Torness and Berwick Bank OWF (online meeting)				
23 September 2020	Feedback during joint meeting	East Lothian Council	General preference for sites in the vicinity of the more industrialised area (region around the nuclear power station/cement works/quarry).	The comments on individual sites are noted. The options appraisal report presents the findings of the comparison of site options based on consideration of environmental, technical and economic aspects.
30 September 2020	Email: feedback following joint meeting	East Lothian Council	ELC comment that given the terms of Policy EGT3 and Policy EGT4, they wish to understand why it is not possible to locate a converter station to the west side of Torness (Site E1). E1 appears to be the most logical position for such a large piece of infrastructure in an otherwise very sensitive location.	The options appraisal process is underpinned by a requirement for SP Energy Networks to comply with its licence obligations and statutory duties. In particular section 9 of the Electricity Act 1989 requires the company to “develop and maintain an efficient, coordinated and economical system of electricity transmission”. In addition,

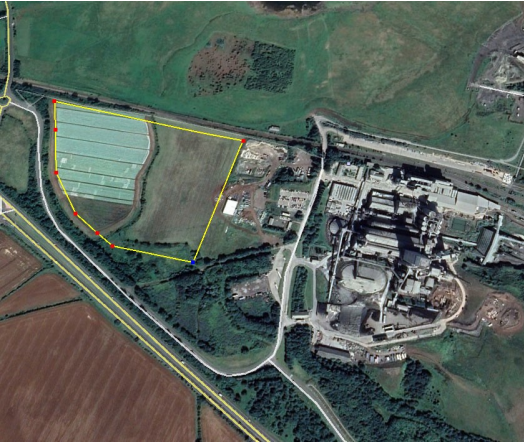


Date	Type	Consultee	Summary of Issues Raised	How Issues Addressed
				<p>under Schedule 9 of the Electricity Act 1989 the company requires to do what it reasonably can to mitigate the environmental effects of proposals for new transmission infrastructure. The appraisal has also been conducted in accordance with relevant guidance including the Horlock Rules (National Grid Company plc, 2006) which provide guidelines for the siting and design of new substations, or substation extensions, to avoid or reduce the environmental effects of such developments.</p> <p>The options appraisal identified that E1 being located immediately adjacent to Torness Power Station would provide some visual cohesion with existing be viewed in the context industrial structures. However, it was also identified that the site is exposed and would be perceptible from a wide area. In addition, Torness Power Station is currently scheduled to be decommissioned in 2030. E1 is also with a Special Landscape Area and designated as constrained coast (generally undeveloped areas where new coastal development should generally be</p>

Date	Type	Consultee	Summary of Issues Raised	How Issues Addressed
				<p>avoided) under policy DC6. Countryside and Coast SPG includes reference to the need to maintain the openness and lack of clutter around Torness Power Station to avoid providing visual scale comparisons in particular in views from the A1/East Coast Mainline and the coast.</p>
			<p>ELC question whether there has been discussions between the 2 projects on the co-siting of the converter stations/substations to limit the visual and other impacts.</p>	<p>SP Energy Networks and SSE Renewables are sharing relevant project information including potential locations of electrical infrastructure (cable corridors and substation options); this information was considered as part of the engineering component of the options appraisal. The Berwick Bank OSW onshore substation is potentially to be located in same area at Site G. The site would not be large enough to accommodate both developments.</p>

APPENDIX 7 DETAILED ENVIRONMENTAL CONSTRAINTS TABLES (TABLE 4.3 AND TABLE 5.1)



Table 4.3 Site Options Appraisal



Table 5.1 Route Options Appraisal



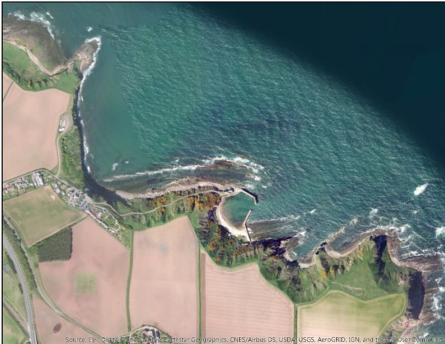
Torness Project						
Site	Archaeology & Cultural heritage	L&V Aspects	Ecology & Nature Conservation	Transport & Access	Key Cable Routing Implications/Land Issues	Plan Photographs
Converter Station						
CD1 (9.3ha)	<p>The site is located within the Second Battle of Dunbar inventory battlefield (Ref: BTL7), a designated heritage asset of National importance. The site comprises a field that has numerous curvilinear features within it visible in modern aerial photographs. These are recorded in the ELC HER and the NRHE as non-designated assets (HER number: MEL2476; Canmore ID 127645), and interpreted as an undated enclosure (i.e. of potential high archaeological significance) and a quarry. 1st Edition OS mapping of the site indicates that there is a limestone quarry to the immediate south of the site, which may account for the non-designated asset's attribution as a quarry. In terms of the wider context around the site, the boundary for the First Battle of Dunbar (Ref: BTL31) is located 100m southwest of the site. Little Pinkerton prehistoric settlement (SM5837) is located 430m southwest of the site. Given that there is a designated heritage asset of National importance covering the entirety of the site, CD1 would not be preferred as a site for new infrastructure in terms of archaeology and cultural heritage. Considering the nature of the proposed development, and the distance to and significance of designated assets in the vicinity, consideration of setting impacts should be considered should this site be taken forward.</p>	<p>This site benefits from its location in close proximity to the cement works and the existing mature vegetation to the south and west. The site is split in two fields and the converter station would be ideally located in the eastern field - this benefits by being closer to the cement works and on lower ground than the western field, however this field alone is slightly smaller than 4ha. The converter station would be visible from the footpath and national cycle route 76 adjacent to its northern boundary; potentially sections of Dunbar Camping and Caravanning Club Site; the southern end of the neighbouring Dunbar Golf Club course; and from Whitesands Beach (however the actual beach itself is on lower ground with views towards this site filtered by intervening landform and vegetation). Some properties to the south-west and south may have views of the converter station, but existing screening is already in place for these properties to help screen the cement works and adjacent landfill site. When perceptible, the building would be viewed within the context of the adjacent cement works. The site lies within the eastern boundary of SLA 7 Doonhill to Chesters. Mitigation planting to help screen the converter station would be appropriate along the northern boundary of this site. Industrial development is retained to the east of the A1.</p>	<p>This site is of low value to biodiversity comprising rough grassland and species such as thistles and docks which are common and widespread although retaining the boundary features where possible would be beneficial. There is good habitat for a variety of species in the nearby area of the regenerating quarry (Whitesands Quarry Nature Reserve) therefore the loss of this small area would not be considered to be significant. There are no ecological designations within this site however the nearby coastline is a designated site of special scientific interest (SSSI).</p>	<p>This site is convenient from an access perspective, particularly for construction, due to its proximity to the A1 and the existing cement works access via a roundabout. The junction from the A1 with the A1087 is a priority junction, although the central reservation is sufficiently wide to accommodate most HGVs turning right.</p> <p>Abnormal loads, expected to arrive from the north, may require some amendments to the roundabout serving the cement works, but these would be relatively minor. There are no structures in the local area that present an obstacle for abnormal loads.</p>	<p>Approximate distance from coast (DC Cable length) - 1km Approx. distance from converter to R1/R2 substation (AC Cable) - 5.1km Any future site extension constrained by cement works, nature reserve and A1. Cable corridor will need to avoid waterbody within adjacent Whitesands Quarry Nature Reserve. 1 minor road crossing Site is ALC Grade 3.1</p>	
D2 (15.5ha)	<p>The western third of the site (approx 5ha) is within the Second Battle of Dunbar inventory battlefield (Ref: BTL7), a designated heritage asset of National importance. Within the site, there is an antiquarian reference to a findspot of a collared urn (a prehistoric ceramic vessel relating to cremation burial practice) being discovered on the East Links, Dunbar, but the coordinates of its location are imprecise, and it cannot be confirmed that it was identified within the site. There are references to several archaeological geophysical surveys having been undertaken on arable fields north of the East Coast Main Line (that forms the southern boundary of the site) in advance of quarry development. A total of 16ha of detailed gradiometer survey was carried out in 16 sample areas in eight arable fields north of the main east coast railway line, between the Dry Burn and the Blue Circle Industries cement works. The survey identified three main areas of archaeological significance: A prehistoric palisaded enclosure, a complex of ditch type anomalies, and the Late Mesolithic/Early Neolithic features identified during the evaluation. At a point centred 25m to the north of the site, a prehistoric roundhouse was confirmed by evaluation (HER number: MEL9568). Further recent excavations have revealed six definitive stone-built structures along with associated areas of flagstones, stone revetment, various walls and a number of cut features of Iron Age date (Canmore ID 357761), centred 45m north of the site. Within the wider vicinity of the site, the noteworthy excavated Mesolithic settlement site of East Barns (HER No. MEL4588), where 25,000 flints were discovered, is located 830 m to the northwest. The nearest designated assets are the scheduled ring ditches and cropmarks at Skateraw (SM4040) 420m east of the site, and the Dryburn Bridge enclosure and long cist cemetery (SM4038) located 450m southeast of the site. Given that there is a designated heritage asset of National importance covering one third of the site, D2 would not be preferred as a site for new infrastructure in terms of archaeology and cultural heritage unless the inventory battlefield can be avoided (remaining area is 10ha area). Considering the nature of the proposed development, and the distance to and significance of designated assets in the vicinity, consideration of setting impacts should be considered should this site be takenforward.</p>	<p>This site benefits from its relative proximity to the landfill and quarry sites, however the site is relatively open and a converter station would be visible from sections of the coastal core path, national cycle route 76, coastline and wider areas to the east and south-east. To the south the site is partially screened by the raised landform of the adjacent landfill site. If utilised the converter station should be introduced at the western extents of this site, as this would reduce its perceptibility from the wider landscape and keep the structure close to the other large-scale development within the study area. Industrial development is retained to the east of the A1.</p>	<p>The site is in close proximity to the existing quarry which provides good habitat for a variety of species within areas of restoration to the west of the active area (Whitesands Quarry Nature Reserve). This site however is presently being used for arable farming and is of low value to biodiversity although may be used by ground nesting birds and foraging birds if stubble is left over winter. The habitat is largely common in the wider area however so the loss of a small amount would not considered to be significant. At the time of the Wardell Armstrong site surveys, this site was regarded as having a parish/neighbourhood value due to the presence of gull roosts at that time. There are no ecological designations within this site however the nearby coastline is a designated SSSI.</p>	<p>The site is located adjacent to an existing road directly off the A1. This site is convenient from an access perspective, particularly for construction, due to its access to the A1 to the east. The junction from the A1 is a priority junction with a right turning lane for traffic from the south. There is no central reservation but visibility is good in both directions.</p> <p>Abnormal loads may require some amendments to the junction with the A1, but these would be relatively minor and appear to be achievable. The A1 bridge over the East Coast Main Line will need to be checked for weight restrictions, but it is expected to be capable of accommodating abnormal loads given the strategic importance of the A1.</p>	<p>Approximate distance from coast (DC Cable length) - 650m Approx. distance from converter to R1/R2 substation (AC Cable) -3.5km 1 minor road crossing Site is ALC Grade 3.1 Site is located within a minerals safeguarding area under East Lothian Local Plan: Oxwellmains Quarry</p>	
E1 (12.2ha)	<p>The site is located 11m west of the Torness Nuclear Power Station at its closest point, and comprises arable agricultural fields. There are no designated or non-designated assets located within the site. There are a series of non-designated assets located east of the site, including field boundaries (MEL10025) and a ring ditch (MEL1802) located 19m and 8m from the site respectively. There are also several records of recorded maritime losses (e.g. MEL10499) nearby (offshore- which may constrain the landfall option). The nearest designated asset is the scheduled monument of Skateraw ring ditches and cropmarks (SM4040), 790m west of the site. The field to the west of the site has a record of having been a WWI military emergency landing ground (MEL10407 - recorded as a point rather than a polygon); it is uncertain whether the site comprised part of the landing ground. Given the significance of the baseline information available, site E1 could be suitable for infrastructure. The density of non-designated assets within the wider vicinity suggests the potential for buried archaeological remains within the arable fields which comprise the site is likely to be moderate. Considering the nature of the proposed development, and the distance to and significance of designated assets in the vicinity, it may be possible to scope out impacts on setting at an early stage for a development at this location.</p>	<p>As per E2 except in a site perceptible from a wider area (this location is on relative high ground in comparison to the power station itself and the location of site E2). The site lies within SLA 30 Thorntonloch to Dunglass Coast. In addition the site is directly adjacent to the coastal path and a viewing point over Skateraw Bay.</p>	<p>E1 is similar habitat as that present in E2 and is considered to be of low value to biodiversity although Wardell Armstrong classed this site as having a local to parish level value in terms of ornithology due to its close proximity to the coastal habitats. As with E2, it is in close proximity to the pSPA and also lies adjacent to the Barns Ness Coast Site of Special Scientific Interest so any works here would need to ensure no adverse impact on this designated site.</p>	<p>The site is located immediately to the west of Torness Nuclear Power Station. It is assumed that access to this site could be shared with the power station, which benefits from a high standard of access to the A1, including right turning lane and a wide central reservation. This access will have been used by large HGVs to construct the power station.</p> <p>It is anticipated that abnormal load deliveries will be catered for within the existing access, possibly with minor amendments.</p>	<p>Approximate distance from coast (DC Cable length) - Adjacent to coast Approx. distance from converter to R1/R2 substation (AC Cable) - 2.1km</p> <p>Discussions with landowners (EDF) indicate that it is unlikely that the site can be secured. EDF raise security and nuclear safety concerns. EDF records indicate that the site was a previous quarry and subsequent landfill (construction waste) site used during construction of the Torness Nuclear Power Station. Landfill records confirm a landfill site that covers the north-west edge of E1; the landfill is labelled as waste management with an inert waste type which closed in 1993. Site is ALC Grade 3.1</p>	


Torness Project						
Site	Archaeology & Cultural heritage	L&V Aspects	Ecology & Nature Conservation	Transport & Access	Key Cable Routing Implications/Land Issues	Plan Photographs
G (12.5ha)	There is a single non-designated heritage asset recorded within the site, Harp Law cropmarked enclosure (HER No. MEL6334; Canmore ID 239587). This is located in the south-eastern field within the site. Within the wider vicinity, the nearest designated asset is the scheduled monument of Thornton Mill enclosure (SM3990), located 280m west of the site. Given the significance of the archaeological baseline information available, site G could be suitable for infrastructure, however, given the record of a cropmarked enclosure within the site, G has high potential for the discovery of buried archaeological remains. Considering the nature of the proposed development, and the distance to and significance of designated assets in the vicinity, consideration of setting impacts should be considered should this site be taken forward.	An exposed site where the introduction of a large converter building would noticeably alter the landscape. However, there are only a small number of visual receptors that would be affected - a small number of properties to the west of the site, a small section of the national cycle route 76 and users of the A1. Views from the beach are likely to be screened by landform, although the coastal path is on slightly higher ground and the development would be perceptible from the path. Views from Thorntonloch Caravan Park would need to be considered, but it is likely that the development would be heavily filtered by landform and an intervening woodland belt. The higher up (i.e. further west) the landform the site rises the more exposed it would become to visual receptors. The development would be most visible from the south, and therefore Torness Nuclear Power Station would likely backdrop the site and reduce its visual impact. Although there is limited tree planting in the local area, some does exist adjacent to the east-coast mainline and this could be extended to help filter views of the development from the east. If introduced at this site the development would be the only major industrial development located to the west of the A1, and this would create the perception of increasing the size of the disturbed/ industrial landscape in this area.	This site lies just south of the railway line, in an agricultural field (arable) of low value to biodiversity. Wardell Armstrong did not specify any potential constraints in regard to biodiversity and regarded it as having a low value in terms of ornithology, additionally, the site is not within any designated sites.	Access to this site is constrained due to the barriers present from the A1. There are a number of rural lanes (two to the north, two to the south) that could offer access for some construction vehicles, however all of the most direct routes require crossing the East Coast Main Line. Each of the junctions are sub-standard, suitable for low flows and local access only. Crossing the railway underneath is height restricted in both locations as well as a restricted road alignment. The bridges over the railway are restricted in road alignment and width/weight. The railway is too strategic to allow an at-grade temporary crossing for construction purposes, even abnormal loads, with works to facilitate a crossing being very difficult. Construction access could be taken from the west at the Innerwick Junction (importantly south of the railway), before heading east along rural lanes, passing through Crowhill. There are residential receptors in Crowhill and potentially restricted road alignment, but further analysis would be required to assess this as a potential route for abnormal loads.	Approximate distance from coast (DC Cable length) - 450m Approx. distance from converter to R1/R2 substation (AC Cable) - 1.1km Crossing of the A1 Crossing of East Coast Main Line Numerous local road crossings Site is ALC Grade 3.1	
G1 (8ha)	There are no designated assets within the site. There is a non-designated asset in the form of a trackway and enclosure at Lawfield (MEL11335) recorded from aerial photography. This is recorded in the Historic Environment Record as a point at NGR NT 75611 73101 25m north of the site, but the aerial photography visible on the Canmore database (Canmore ID 312786) suggests that the cropmarks extend across the field and into the site. In terms of the wider vicinity around the site, the nearest designated asset is the inventory garden and designed landscape of Dunglass (GDL00154), located 370m south of the site. Given the significance of the baseline information available, site G1 could be suitable for infrastructure, however, the density of cropmarked features suggests a high potential for buried archaeological remains. Considering the nature of the proposed development, and the distance to and significance of designated assets in the vicinity, consideration of setting impacts should be considered should this site be taken forward.	An exposed site where the introduction of a large converter building would noticeably alter the landscape. The land is relatively level with a gradual rise to the south-west, which would result in large-scale development here being visually prominent. The site does not have the benefit of any directly adjacent pre-existing screening from either woodland or landform. Visual receptors that would be affected include a small number of properties 300m south of the site (Birnieknowes), and a further property 300m west of the site (Lawfield). In addition the development would be visible from a section of national cycle route 76 and users of the A1 would pass the development in close proximity. Views from the beach are likely to be screened by landform, although the coastal path is on higher ground and the development would be prominent from the path. Views from Thorntonloch Caravan Park would need to be considered, but it is likely that the development would be heavily filtered by landform and an intervening woodland belt. The development would be viewed within the wider context of the existing Torness Power Station, however it would stretch the overall 'industrial' nature of this short section of coastline and would be the only major industrial development located to the west of the A1 increasing the perception and size of the disturbed/ industrial landscape. Dunglass Historic Garden and Designed Landscape (GDL) is located 400m east and 500m south of the site and occasional views from within the GDL are likely, although the woodland within and around the GDL would screen the majority of views towards towards the development.	This site lies just south of the railway line and A1, in what appears to be an agricultural field (arable) of low value to biodiversity. Likely to be very similar habitat to option G. The site is not within any designated sites and neither is the adjacent area of coast although there is a SSSI c.1 km to the south along the coast.	Access to this site is constrained due to the barriers present from the A1. There are rural roads either side of the site that could offer access for some construction vehicles, however each of these routes require crossing the East Coast Main Line. The eastern route has some potential as the road is of a good standard, although the junction onto the A1 is restricted such that HGVs can only turn in/out from the north, which may not be an issue if materials are sourced from Edinburgh area and associated port facilities. The bridge over the railway and subsequent junction is slightly restrictive in road alignment and will need investigation into the weight capabilities and/or temporary measures that could be adopted to carry abnormal loads. The western route would require crossing the railway underneath, which is height restricted as well as a restricted road alignment and would therefore not be favourable. The railway is too strategic to allow an at-grade temporary crossing for construction purposes, even abnormal loads, with works to facilitate a crossing being very difficult.	Approximate distance from coast (DC Cable length) - 300m Approx. distance from converter to R1/R2 substation (AC Cable) - 1.7km Crossing of the A1. Crossing of East Coast Main Line. 1 minor road crossing. Site is ALC Grade 2	
M1 (21.8ha)	The survey area for a previous geophysical survey of the Neart Na Gaoithe Onshore Works, Thorntonloch To Crystal Rig II Wind Farm cable (Event No. EEL1008) crossed through the centre of the site in an east-west direction. This identified geophysical anomalies identified as possible ditches (MEL11239, MEL11240, MEL11241, MEL11243, MEL11244, MEL11245), a possible building (MEL11242), a possible ditch and pit (MEL11237), and a possible ditch, pit and enclosure (MEL11238). Also identified from cropmark evidence within the site is a possible trackway (MEL1890) and agricultural features (MEL1971). In terms of the wider vicinity around the site, the nearest designated asset is the scheduled monument of Thurston Mains enclosure (SM5845) located 190m south of the site. Given the significance of the baseline information available, site M1 could be suitable for infrastructure, however, the density of cropmarked features and known geophysical anomalies suggests a high potential for buried archaeological remains. Considering the nature of the proposed development, and the distance to and significance of designated assets in the vicinity, consideration of setting impacts should be considered should this site be taken forward.	This is a similar site to sites M2 and M3 (see below) but without the existing level of screening of those sites. However, the site is still well screened from all visual receptors, excluding a local road adjacent to the site boundary. Although away from the preferred industrial landscape around the cement works the site is within a landscape where steel pylons, OHL and wind turbines are prominent landscape features. The size of this site creates the impression of this being an open landscape and the introduction of a converter station would be difficult to mitigate and it would appear visually incongruous with the existing baseline.	This site comprises similar habitat to M2 and M3, which is considered to be low value in terms of biodiversity. Wardell Armstrong also considered this site option to be of low value in terms of ornithology. There are no designated sites within the site but there is long-established woodland (of plantation origin) surrounding the site on three and a half sides which is not expected to be affected should the converter station be placed here, as long as protection measures are put in place. There is a water body situated between M1 and M2 which would need to be surveyed should this site be taken forward.	Access to this site is via Innerwick Junction on the A1, which is a priority junction with right turning lane and reasonable geometry. The route beyond the A1 is initially of a reasonable width, narrowing and increasing in gradient with overhanging trees as it passes Thurston Manor Caravan Park. Local to the site, the rural road is only single carriageway, although provides a two-way section at its eastern end. The route for construction traffic keeps away from most residential receptors, except for the caravan park. Abnormal loads have been transported along the route from the A1 associated with wind farms, however some adjustment to the priority junction local to the site is likely to be required. There appear to be no obstructions in doing so.	Approximate distance from coast (DC Cable length) - 3.8km Approx. distance from converter to R1/R2 substation (AC Cable) - 3.8km Proposed NGN onshore cable crosses the site Crossing of the A1 Crossing of East Coast Main Line Numerous local road crossings Thurston Mains Burn to the south and Dry Burn to the north and associated vegetated valleys expected to influence cable routing to this site. Site is ALC Grade 3.1	

Torness Project						
Site	Archaeology & Cultural heritage	L&V Aspects	Ecology & Nature Conservation	Transport & Access	Key Cable Routing Implications/Land Issues	Plan Photographs
M2 (8ha)	The northern edge of the site has previously formed part of a survey area for a geophysical survey of the Neart Na Gaoithe Onshore Works, Thorntonloch To Crystal Rig II Wind Farm cable (Event No. EEL1008). This identified geophysical anomalies interpreted as possible ditches and oval pits (HER number: MEL11246) in the northeast corner of the site. Possible ditches were also identified from the same survey in the northwest corner of the site (HER No. MEL11247). In the vicinity of the site, there is a record of a building and enclosure on the 1st Edition OS map (HER number: MEL8756) located 135m north of the site. A findspot of a prehistoric flint scraper was identified at Woodhall Farm (MEL9237) in 2006, 130m north of the site. The nearest designated assets are two scheduled monuments: Woodhall Farm enclosure (SM5930), located 300m southeast of the site, and Thurston Mains enclosure and roundhouse and ring ditch (SM5845) located 410m east of the site. Given the significance of the baseline archaeological information available, site M2 could be suitable for infrastructure, however, given the results of the geophysical survey over a proportion of the site, M2 has high potential for the discovery of buried archaeological remains. Considering the nature of the proposed development, and the distance to and significance of designated assets in the vicinity, consideration of setting impacts should be considered should this site be taken forward.	Site is well screened from all visual receptors, excluding a local road adjacent to the site boundary. Although away from the preferred industrial landscape around the cement works the site is within a landscape where steel pylons, OHL and wind turbines are prominent landscape features. Good existing screening from a tree belt around the site, with the potential for further mitigation planting. Ideally the development would be within the north of the field as the landform rises to the south.	The site is agricultural land (arable) which is common and widespread in the wider area, therefore the loss of a small area would not be considered significant for biodiversity. However, Wardell Armstrong undertook ornithological site survey work which concluded that this site was of local value due to the woodland fringes present and the tree shelter belt separating M2 and M3 was found to support breeding Buzzard. The field is bordered on three sides by long-established woodland (of plantation origin), however it is not anticipated that this would be affected if this site is selected for the converter station, as long as suitable protection is put in place. There is a water body situated between M1 and M2 which would need be surveyed should this site be taken forward.	Access to this site is via Innerwick Junction on the A1, which is a priority junction with right turning lane and reasonable geometry. The route beyond the A1 is initially of a reasonable width, narrowing and increasing in gradient with overhanging trees as it passes Thurston Manor Caravan Park. Local to the site, the rural road is only single carriageway, although provides a two-way section at its eastern end. The route for construction traffic keeps away from most residential receptors, except for the caravan park. Abnormal loads have been transported along the route from the A1 associated with wind farms, however some adjustment to the priority junction local to the site is likely to be required. There appear to be no obstructions in doing so.	Approximate distance from coast (DC Cable length) - 4.6km Approx. distance from converter to R1/R2 substation (AC Cable) - 4.2km Proposed NGN onshore cable runs parallel to the northern boundary of the site Crossing of the A1 Crossing of East Coast Main Line Numerous local road crossings Thurston Mains Burn to the south and Dry Burn to the north and associated vegetated valleys expected to influence cable routing to this site. Site is ALC Grade 3.1 SEPA Flood Maps show the site as having High/Medium Flood Risk from Surface Water	
M3 (13ha)	The northern edge and northwestern corner of the site formed part of a survey area for a previous geophysical survey of the Neart Na Gaoithe Onshore Works, Thorntonloch To Crystal Rig II Wind Farm cable (Event No. EEL1008). This identified five suspected areas of archaeological activity, comprising three possible ditch groups (HER Nos. MEL11249, MEL11250, MEL11251) and an area of ditches and pits (MEL11248). The nearest designated asset is the scheduled monument of Woodhall Farm enclosure (SM5930), located 310m south-southeast of the site. Given the significance of the archaeological baseline information available, site M3 could be suitable for infrastructure, however given the results of the geophysical survey over a proportion of the site, M3 has high potential for the discovery of buried archaeological remains. Considering the nature of the proposed development, and the distance to and significance of designated assets in the vicinity, consideration of setting impacts should be considered should this site be taken forward.	Site is well screened from all visual receptors, excluding a local road adjacent to the site boundary. Although away from the preferred industrial landscape around the cement works the site is within a landscape where steel pylons, OHL and wind turbines are prominent landscape features. The field is a rounded hill with the high ground running east-to-west through the centre of the site - this has the advantage of providing further screening should the development occur in the north of the site, but also a difficulty relating to potential earthworks. Good existing screening from a tree belt around the site, with the potential for further mitigation planting. Ideally the development would be within the north-east corner of the site.	The site is agricultural land (arable) which is common and widespread in the wider area, therefore the loss of a small area would not be considered significant for biodiversity. However, Wardell Armstrong undertook ornithological site survey work which concluded that this site was of local value due to the woodland fringes present and the tree shelter belt separating M2 and M3 was found to support breeding Buzzard. The east border of the field comprises long-established woodland (of plantation origin) however it is not anticipated that this would be affected if this site is selected for the converter station, as long as suitable protection is put in place. There is a water body situated between M1 and M2 which would need be surveyed should this site be taken forward.	Access to this site is via Innerwick Junction on the A1, which is a priority junction with right turning lane and reasonable geometry. The route beyond the A1 is initially of a reasonable width, narrowing and increasing in gradient with overhanging trees as it passes Thurston Manor Caravan Park. Local to the site, the rural road is only single carriageway, although it provides a two-way section at its eastern end. The route for construction traffic keeps away from most residential receptors, except for the caravan park. Abnormal loads have been transported along the route from the A1 associated with wind farms, however some adjustment to the priority junction local to the site is likely to be required. There appear to be no obstructions in doing so.	Approximate distance from coast (DC Cable length) - 4.9km Approx. distance from converter to R1/R2 substation (AC Cable) - 4.6km Proposed NGN onshore cable crosses the north west corner of the site Crossing of the A1 Crossing of East Coast Main Line Numerous local road crossings Thurston Mains Burn to the south and Dry Burn to the north and associated vegetated valleys expected to influence cable routing to this site. Site is ALC Grade 3.1	
RSK1 (7.8ha) refined to RSK1 Rev01 (9.8ha)	RSK1 original site boundary overlapped with the scheduled monument of Dryburn Bridge enclosure (SM4038) in the northwest corner of the site. RSK1 site boundary was therefore amended to avoid the SM by 50m buffer. In terms of the wider vicinity around the site, there is a further scheduled monument, Skateraw ring ditches and cropmarks (SM4040) located 120m north of the site. The survey area for a geophysical survey of the Neart Na Gaoithe Onshore Works, Thorntonloch To Crystal Rig II Wind Farm cable (Event No. EEL1008) is located immediately south of the A1 road, which forms the southern boundary of the site, 40m south of the site boundary. This identified possible ditch, boundary or enclosure features (MEL11232, MEL11231). Given existence of one prehistoric scheduled monument adjacent to the site, a second located within 120m, and ditch/pit/enclosure features identified through geophysical survey 55m south of the site indicates that the potential for the discovery of significant archaeological remains is high. Considering the nature of the proposed development, and the distance to and significance of designated assets in the vicinity, consideration of setting impacts should be considered should this site be taken forward, and are likely to be a constraint influencing the location or design of the development.	This site benefits from its relative proximity to the landfill and could just about be considered to be within the same landscape area as the landfill, cement works and quarry sites. The site also benefits by the retention of industrial development to the east of the A1. The site is partially screened by the rising ground of the A1 embankment directly adjacent to the site and existing woodland vegetation directly to the south and east. However the site appears relatively open, particularly from landscape to the west and residential properties on higher ground to the south e.g. from Inverwick; as well as southbound users of the A1. It is likely a converter station would be visible from sections of the national cycle route 76 but not visible from the beach areas. Views from the nearby Thurston Manor Leisure Park (to the south-west of the site) and residential properties at Skateraw (to the east) would be heavily filtered by intervening vegetation. Depending on the direction of the view a development on this site would often be viewed with either the power station or cement works as a backdrop.	An agricultural field (arable) with low value to biodiversity. The site lies between the A1 and the train line and has no designations, although the nearby coastline is a SSSI. Retaining the boundary features would be beneficial.	The site is located immediately adjoining the A1, while the East Coast Main Line forms the northern boundary. There is no direct access to the site from the A1, although it may be possible to construct an access, subject to further investigations, including an examination of levels. Abnormal load deliveries are not expected to encounter any difficulties due to the ease of access to the A1, subject to a direct access being achievable.	Approximate distance from coast (DC Cable length) - 750m Approx. distance from converter to R1/R2 substation (AC Cable) - 2.2km Crossing of East Coast Main Line 1 or 2 minor road crossings Dry Burn to the north Scheduled monument, Skateraw ring ditches and cropmarks (SM4040) located 120m north of the site. Residential properties around Skateraw to the north east. Site is ALC Grade 2. Any future site extension constrained by railway line, A road and Scheduled monuments.	

Terness Project						
Site	Archaeology & Cultural heritage	L&V Aspects	Ecology & Nature Conservation	Transport & Access	Key Cable Routing Implications/Land Issues	Plan Photographs
R2 (4ha)	There are no designated or non-designated assets located within the site. The nearest heritage asset is the scheduled monument of Branxton enclosure (SM5958), located 25m southeast of the site and within the same field. Given the proximity of the site to a scheduled monument, the potential for the discovery of buried archaeological remains within the site is high. Considering the nature of the proposed development, and the distance to and significance of designated assets in the vicinity, consideration of setting impacts should be considered should this site be taken forward, and are likely to be a constraint influencing the location or design of the development.	Potentially a well screened location in a dip in the landscape, with higher ground enclosing the site except to it's north-west. There is limited scope for visual impacts within the wider study area. However, the likely size of the converter station means that significant earthworks would be required and even then the station is likely to be visible above the surrounding landscape, with potentially significant effects on the properties between 200 and 400m north-west of the site. When perceptible the converter station would be viewed in conjunction with the existing adjacent substations.	Site appears to be arable land with low value to biodiversity. There is an area of long-established woodland (of plantation origin) to the south-west of the site but this will not be affected and there are no other ecological designations.	Access to this site is constrained from the A1 due to the barriers present. There are a number of rural roads that could offer access for some construction vehicles, however all of the most direct routes require crossing the East Coast Main Line. Each of the junctions are sub-standard, suitable for low flows and local access only. Crossing the railway underneath is height restricted in both locations as well as a restricted road alignment. The bridges over the railway are restricted in road alignment and width/weight. The railway is too strategic to allow an at-grade temporary crossing for construction purposes, even abnormal loads, with works to facilitate a crossing being very difficult. These access routes may be suitable for some construction vehicles and potentially consider one-way routing to minimise conflicts between large goods vehicles. Construction access could be taken from the west at the Innerwick Junction (importantly south of the railway), before heading east along rural lanes. There are likely to be some amendments required to junctions and bends along this route, but the bridge near Branxton is narrow and has tight bends either side. It may be possible for an abnormal load to cross the watercourse with a super-structure over the bridge at an angle to overcome the bends. However, for other types of construction vehicles, further investigation would be required as it may be of insufficient width to accommodate these and traffic management would need to be installed, such as temporary signals, as a minimum.	Approximate distance from coast (DC Cable length) - 1.6km Approx. distance from converter to R1/R2 substation (AC Cable) - 0km Crossing of the A1 Crossing of East Coast MainLine 1 minor road crossing 1 minor Burn/ditch crossing near coast. Site is ALC Grade 3.1 SEPA Flood Maps show part of southern part of the site as having High Flood Risk from Surface Water	
Substation						
R1 (4.3ha)	There are no designated or non-designated assets located within the site. The nearest non-designated asset is a 19th century record of the excavation of four standing stones and a cremation burial and urn at Edinken Bridge (Canmore ID 58919), located 50m northwest of the site. The nearest designated asset is the scheduled monument of Branxton enclosure (SM5958), located 265m east of the site. Given the proximity of the site to the recorded site of standing stones and a prehistoric burial, the potential for the discovery of buried archaeological remains within the site is moderate to high. Considering the nature of the proposed development, and the distance to and significance of designated assets in the vicinity, consideration of setting impacts should be considered should this site be taken forward.	Similar to site R2, but slightly more exposed and significant earthworks would be required.	Another small agricultural field (potentially arable or grazing) with low ecological value. Wardell Armstrong identified it as having a low ornithological value due to its small size, as with R2. There are no designated sites within it although there is an area of long-established woodland (of plantation origin) to the south-east which is separated by a road and will therefore not be affected by any development here.	Access to this site is constrained due to the barriers present from the A1. There are a number of rural lanes that could offer access for some construction vehicles, however all of the most direct routes require crossing the East Coast Main Line. Each of the junctions are sub-standard, suitable for low flows and local access only. Crossing the railway underneath is height restricted in both locations as well as a restricted road alignment. The bridges over the railway are restricted in road alignment and width/weight. The railway is too strategic to allow an at-grade temporary crossing for construction purposes, even abnormal loads, with works to facilitate a crossing being very difficult. These access routes may be suitable for some construction vehicles and potentially consider one-way routing to minimise conflicts between large goods vehicles. Construction access could be taken from the west at the Innerwick Junction (importantly south of the railway), before heading east along rural roads. There are likely to be some amendments required to junctions and bends along this route, but the bridge near Branxton is narrow and has tight bends either side. Further investigation would be required as it may be of insufficient width to accommodate general construction vehicles and traffic management would need to be installed, such as temporary signals, as a minimum.	AC cables from Site G would provide the most direct route. 1 minor road crossing required AC cables from RSK1 would need to cross Thornton Burn AC cables from Site D2 constrained to south by landfill, crossing of Thornton Burn and Dry Burn required AC cables from E1/E2 would require crossing of A1, railway and Thornton Burn. Site is ALC Grade 3.1	
R2 (2.7ha)	There are no designated or non-designated assets located within the site. The nearest heritage asset is the scheduled monument of Branxton enclosure (SM5958), located 25m southeast of the site and within the same field. Given the proximity of the site to a scheduled monument, the potential for the discovery of buried archaeological remains within the site is high. Considering the nature of the proposed development, and the distance to and significance of designated assets in the vicinity, consideration of setting impacts should be considered should this site be taken forward, and are likely to be a constraint influencing the location or design of the development.	Well screened location in a dip in the landscape, with higher ground enclosing the site except to it's north-west. There is limited scope for visual impacts within the wider study area, from a sub-station on this site. If perceptible it would be viewed in conjunction with the existing adjacent substation. Due to the landform some earthworks impacting the landscape are likely.	Small site which appears to be arable land with low value to biodiversity. Wardell Armstrong also classed it as having a low ornithological value due to its small size. There is an area of long-established woodland (of plantation origin) to the south-west of the site but this will not be affected and there are no other ecological designations.	Access to this site is constrained due to the barriers present from the A1. There are a number of rural lanes that could offer access for some construction vehicles, however all of the most direct routes require crossing the East Coast Main Line. Each of the junctions are sub-standard, suitable for low flows and local access only. Crossing the railway underneath is height restricted in both locations as well as a restricted road alignment. The bridges over the railway are restricted in road alignment and width/weight. The railway is too strategic to allow an at-grade temporary crossing for construction purposes, even abnormal loads, with works to facilitate a crossing being very difficult. These access routes may be suitable for some construction vehicles and potentially consider one-way routing to minimise conflicts between large goods vehicles. Construction access could be taken from the west at the Innerwick Junction (importantly south of the railway), before heading east along rural lanes. There are likely to be some amendments required to junctions and bends along this route, but the bridge near Branxton is narrow and has tight bends either side. Further investigation would be required as it may be of insufficient width to accommodate general construction vehicles and traffic management would need to be installed, such as temporary signals, as a minimum.	AC cables from Site G/G1 would provide the most direct route. AC cables from Site L2/RSK1 would need to cross Thornton Burn AC cables from Site D2 are constrained to south by landfill, crossing of Thornton Burn and Dry Burn required AC cables from E1/E2 would require crossing of A1, railway and Thornton Burn. Site is ALC Grade 3.1 SEPA Flood Maps show part of southern part of the site as having High Flood Risk from Surface Water	
M2 (8ha)/ M3 (13ha)	See assessment of site as a potential Converter Station location above.	See above.	See above.	See above.	If converter station is located at M sites-only short connection required between converter and substation	
Landfall Options						

Torness Project						
Site	Archaeology & Cultural heritage	L&V Aspects	Ecology & Nature Conservation	Transport & Access	Key Cable Routing Implications/Land Issues	Plan Photographs
Whitesands Bay	Onshore, the area of the site immediately inland from the beach lies within the Second Battle of Dunbar inventory battlefield (Ref: BTL7), a designated heritage asset of National importance. Broxmouth Park inventory garden and designed landscape (GDL00076) lies to the immediate west, and Catcraig, limekilns and limestone quarry scheduled monument (SM5675) lies to the immediate southeast. In terms of non-designated assets, there are records of cists excavated at Dunbar Golf Course (MEL1795). There are also records of a ruined houses (MEL2366, MEL2367). Given that there is a designated heritage asset of National importance covering the entirety of the site, this is not a preferred landfall option for new infrastructure in terms of archaeology and cultural heritage.	Landscape and visual aspects have not been included as a key consideration for landfall sites as it is assumed that permanent infrastructure at the landfall would be buried. Any impacts during construction would be temporary in nature.	This option lies within the Barns Ness Coast SSSI. Offshore, the site also overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA. Several wading birds were observed at the site. However, Wardell Armstrong reported that part of the shoreline includes poor and degraded habitats which lack true dune grasses. There are also areas here which will already be subject to disturbance from parking and amenity areas.	This option would require use of an existing access road that serves a beach car park from the A1087 on the outskirts of Dunbar. However, this could conflict with other roads users and would not be ideal unless the car park is used as a compound and access closed to the public. The adjoining golf course extends southwards along the beach behind the dunes, thus access to these areas of the beach would be more difficult.	Potential for bedrock in nearshore waters - the nearshore waters have subtidal reefs. The appended offshore geology figures indicate that there is the potential for up to 1.5nm of underlying bedrock to extend offshore. Site within the Barns Ness SSSI - the cable would also be likely to have to cross the cable of the Neart Na Goithe OWF in nearshore waters. (NNG OWF is consented for construction and the export cable would extend in a roughly NNW direction from Thorntonloch). Northern part of the bay occupied by a golf course, landfall backed by a large flooded quarry and a cement plant and elevated ground behind the southern part of the beach Wreck in nearshore waters off the Ruddystone Reef	
Barns Ness North	Onshore, the Barns Ness lighthouse, a Category B listed building (LB1465) is present at this site. The lighthouse construction was completed in 1901 by engineer David A Stevenson, including associated coastguard cottages. The lighthouse cottages are used as a rental cottage for tourists, while the lighthouse was decommissioned in 2005. There are also records of three boundary stones (MEL11487, MEL11488 and MEL11489), and an enclosure thought to be a walled garden for the lighthouse keepers (MEL2368). Offshore, there are also recorded losses stranded or lost on Goatness Point: the Wave (Canmore ID 253819); Margaret (Canmore ID 253819); Clan Alpine (Canmore ID 198451); Branch (Canmore ID 328120) and Beta (Canmore ID 199403). Furthermore, there are additional recorded losses off Barns Ness: Scandia (Canmore ID 119987); and HMS Pallas (Canmore ID 195200). Given the density of recorded losses, survey and careful routeing of the cable will be necessary to minimise impacts to non-designated assets.	Landscape and visual aspects have not been included as a key consideration for landfall sites as it is assumed that permanent infrastructure at the landfall would be buried. Any impacts during construction would be temporary in nature.	This site option lies within the Barns Ness Coast SSSI. Intertidal / coastal habitats present include mobile sand, sand dune, dune grassland, shingle and intertidal rocky shore habitats, and species expected include those associated with the SSSI. Wading birds were also observed on the beach. There are pressures of recreational use by walkers and other recreational users. Offshore, the site also overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA.	The site is located close to an existing road directly off the A1. This site is convenient from an access perspective, particularly for construction, due to its access to the A1 to the east. The junction from the A1 is a priority junction with a right turning lane for traffic from the south. There is no central reservation but visibility is good in both directions. Local access would require a haul road across a field to reach landfall, offering the potential for a small compound. Alternatively, this option could use an existing access road that serves a beach car park from the A1087 on the outskirts of Dunbar, requiring a haul road beyond the car park. However, this could conflict with other roads users and would not be ideal unless the car park is used as a compound and access closed to the public.	Potential for bedrock in nearshore waters - the nearshore waters in the bay are particularly constrained due to subtidal reefs. Appended offshore underlying geological figures indicate that the bedrock extends subtidally up to 1.5nm offshore. Site within the Barns Ness Coast SSSI - the cable would also be likely to have to cross the cable of the Neart Na Goithe OWF in nearshore waters. (NNG OWF is consented for construction and the export cable would extend in a roughly NNW direction from Thorntonloch). There is a wreck offshore within the nearshore area off the Ruddystone reef, yet the cable could be easily routed to avoid this.	
Barns Ness	The Barns Ness lighthouse, a Category B listed building (LB1465) is present to the north of the site. The lighthouse construction was completed in 1901 by engineer David A Stevenson, including associated coastguard cottages. The lighthouse cottages are used as a rental cottage for tourists, while the lighthouse was decommissioned in 2005. There is also a recorded loss offshore from the site, the Ecclefechan, close to the Ruddystone reef (Canmore ID 119989), recorded with 100m precision. However, construction would not need to interfere with the lighthouse and the cable could be routed to avoid the wreck, thus archaeological and/or cultural implications are not thought to be of concern.	Landscape and visual aspects have not been included as a key consideration for landfall sites as it is assumed that permanent infrastructure at the landfall would be buried. Any impacts during construction would be temporary in nature.	This site option lies within the Barns Ness SSSI. Intertidal / coastal habitats present include mobile sand, sand dune, dune grassland, shingle and intertidal rocky shore habitats, and species expected include those associated with the SSSI. Wading birds were also observed on the beach. There are pressures of recreational use by walkers and other recreational users. Offshore, the site also overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA.	The site is located close to an existing road directly off the A1. This site is convenient from an access perspective, particularly for construction, due to its access to the A1 to the east. The junction from the A1 is a priority junction with a right turning lane for traffic from the south. There is no central reservation but visibility is good in both directions. Local access would require a haul road across a field to reach landfall, offering the potential for a small compound.	Potential for bedrock in nearshore waters - especially at the northern and southern extents of the beach. Site within the Barns Ness Coast SSSI - the cable would also be likely to have to cross the cable of the Neart Na Goithe OWF in nearshore waters. (NNG OWF is consented for construction and the export cable would extend in a roughly NNW direction from Thorntonloch). There is a wreck offshore within the nearshore area off the Ruddystone reef, yet the cable could be easily routed to avoid this.	
Skateraw Harbour	Skateraw harbour has a number of features of interest. Skateraw Harbour was initially built in the early 1800s, initially for the exploitation of limestone and coal, based on an natural inlet recorded in earlier documents (MEL2373). The category B listed Torness lime kiln is present at the site (LB7707), as are non-designated lime kilns (MEL1898) and a war memorial (MEL9124). The site was also used as an airfield during the First World War, to defend the Firth of Forth and Edinburgh against air ship attacks (MEL10407). Offshore, there are several recorded losses at Skateraw Harbour: The Ribnitz (Canmore ID 119986); the Saxon (Canmore ID 260658); the Antelope (Canmore ID 273767); and the Orient (Canmore ID 274081). Given the density of recorded losses, survey and careful routeing of the cable will be necessary to minimise impacts to non-designated assets.	Landscape and visual aspects have not been included as a key consideration for landfall sites as it is assumed that permanent infrastructure at the landfall would be buried. Any impacts during construction would be temporary in nature.	This site option lies within the Barns Ness Coast SSSI. Offshore, the site also overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA. However, there may be some disturbed areas which could be utilised such as areas close to parking and amenities at Skateraw Beach. Furthermore, Wardell Armstrong reports stated that the site's intertidal habitats were of poor ecological quality, lower than expected for a designated site. A strandline community was noted at the site, and wading birds observed during a recent site visit.	The site is located close to an existing road directly off the A1. This site is convenient from an access perspective, particularly for construction, due to its access to the A1 to the south. The junction from the A1 is a priority junction with a right turning lane for traffic from the south. There is no central reservation but visibility is good in both directions. Local access would require use of a narrow road through the village of Skateraw which leads right up to the carpark on the beach which has sufficient space for construction activities if closed to the public.	Potential for bedrock in nearshore waters - the nearshore waters have subtidal reefs. A route between areas of underlying offlying bedrock is possible. Please refer to appended offshore geological figures. Site partly within the Barns Ness Coast SSSI - the cable would also be likely to have to cross the cable of the Neart Na Goithe OWF in nearshore waters. (NNG OWF is consented for construction and the export cable would extend in a roughly NNW direction from Thorntonloch). Torness Nuclear Power Station to the south and existing navigation for vessels into the port to consider.	

Torness Project						
Site	Archaeology & Cultural heritage	L&V Aspects	Ecology & Nature Conservation	Transport & Access	Key Cable Routing Implications/Land Issues	Plan Photographs
Thorntonloch	The site has few recorded or obvious features of cultural heritage significance. The small hamlet of Thorntonloch is onshore from the site, and there is a record of a ruined building near the shore (MEL2824), and a possible industrial site identified from coastal survey at Lawfield (MEL9367). Offshore (outside of the proposed study area) there are several 18th and 19th recorded shipping losses present, such as the Aimable (Canmore ID 326813).However, construction would not need to interfere with the recorded onshore assets and the cable could be routed to avoid the recorded losses should their location be identified, thus archaeological and/or cultural implications are not thought to be of concern.	Landscape and visual aspects have not been included as a key consideration for landfall sites as it is assumed that permanent infrastructure at the landfall would be buried. Any impacts during construction would be temporary in nature.	This site does not lie within any SSSI and will also be subject to some disturbance already by walkers from the adjacent caravan park. Wardell Armstrong reported that habitats inland from this area are generally low quality. Offshore, the nearshore area of the site does overlap with the Outer Firth of Forth and St Andrews Bay Complex SPA, primarily designated for birds. The intertidal area at Thorntonloch mainly consists of mobile sandy habitat, however, outcrops of bedrock and rocky areas do support birds and associated species (invertebrates, fish, crustaceans etc.). Large groups of wading birds were observed using the bedrock area, during a site visit. Thornton Burn stream running through the centre of the beach also provides an enriched area for feeding birds. A large area of bedrock/boulder scar is present at the north of the beach, close to Tornness Point, this likely extends subtidally and beneath some of the sandy sediments in the bay. The coast is designated as Bilsdean Coast Local Biodiversity Site.	This option is convenient to access, via a rural track that leads off the A1, just south of Torness power station. The track currently serves a house and a small parking area. There are public footpaths along the coastline, used well used by recreational visitors and caravan park users from the north. The beach itself is fairly flat, with rocky areas confined to distinct areas, thus the transport of equipment on the beach itself would be relatively straightforward. Alternative access from the caravan park to the north may be possible, although would affect the amenity of a number of residential receptors.	Potential for bedrock in nearshore waters - the nearshore waters have subtidal reefs, however the beach is long and it is likely that rock does not extend subtidally across the whole bay. Refer to appended offshore geology figures. It would be possible to avoid crossing the export cable of the Neart Na Goithe OWF in nearshore waters. (NNG OWF is consented for construction and the export cable would extend in a roughly NNW direction from Thorntonloch). The landfall for the cable is in the centre of the beach near the Thorntonloch Burn. Landfall for Berwick Bank OWF (Formerly Seagreen 2) also proposed at Thorntonloch. Consultation with the developers for the OWF would be required though to determine their preferred onshore route corridor and exact landfall location Torness Nuclear Power Station immediately to the north	
Southern end of Thorntonloch	The site has few recorded or obvious features of cultural heritage significance. The small hamlet of Thorntonloch is onshore from the site, and there is a record of a ruined building near the shore (MEL2824), and a possible industrial site identified from coastal survey at Lawfield (MEL9367). Offshore (outside of the proposed study area) there are several 18th and 19th recorded shipping losses present, such as the Aimable (Canmore ID 326813). However, construction would not need to interfere with the recorded onshore assets and the cable could be routed to avoid the recorded losses should their location be identified, thus archaeological and/or cultural implications are not thought to be of concern.	Landscape and visual aspects have not been included as a key consideration for landfall sites as it is assumed that permanent infrastructure at the landfall would be buried. Any impacts during construction would be temporary in nature.	This site does not lie within any SSSI and will also be subject to some disturbance already by walkers from the adjacent caravan park, though fewer walkers are expected at the southern end. Wardell Armstrong reported that habitats inland from this area are generally low quality. Offshore, the nearshore area of the site does overlap with the Outer Firth of Forth and St Andrews Bay Complex SPA, primarily designated for birds. The intertidal area at Thorntonloch mainly consists of mobile sandy habitat, however, outcrops of bedrock and rocky areas (mainly at the northern end) do support birds and associated species (invertebrates, fish, crustaceans etc.). Large groups of wading birds were observed using the northern bedrock area, during a site visit. Thornton Burn stream running through the centre of the beach also provides an enriched area for feeding birds. There is a small area of bedrock/boulder scar to the southern end of the beach, supporting wading birds. The coast is designated as Bilsdean Coast Local Biodiversity Site and Thorntonloch Local Geodiversity Site.	This option accessible via a public footpath at the northern end of Thorntonloch beach. There is currently no access to the beach from the southern end, though the A1 runs parallel behind an arable field, sand dune and hedgerow. The public footpath cuts through a sand dune and dunes a rural track that leads to the A1, just south of Torness power station. There are additional public footpaths along the coastline, used well used by recreational visitors and caravan park users from the north. There is a small cluster of buildings inshore. The beach itself is fairly flat, with rocky areas confined to distinct areas, thus the transport of equipment from the northern to southern end of the beach would be relatively straightforward.	There is potential for 0.1 - 0.2 miles of bedrock/till outcrop in nearshore waters (see appended geological figures for the nearshore waters) - the nearshore waters have subtidal reefs, however the beach is long and it is likely that rock doesn't extend subtidally across the whole bay. It would be possible to avoid crossing the export cable of the Neart Na Goithe OWF in nearshore waters. (NNG OWF is consented for construction and the export cable would extend in a roughly NNW direction from the centre of the Thorntonloch beach). Consultation with the developers for the OWF would be required though to determine their preferred onshore route corridor and exact landfall location (which is expected to also be at the southern end of the beach).	
Inlet near Thorntonloch	The site has few recorded or obvious features of cultural heritage significance. There is a record of a non-designated heritage asset (MEL2824), a single unroofed building on the plateau above the inlet. Offshore (outside of the proposed study area) there are several 18th and 19th recorded shipping losses present, such as the Aimable (Canmore ID 326813). However, construction would not need to interfere with the recorded onshore assets and the cable could be routed to avoid the recorded losses should their location be identified, thus archaeological and/or cultural implications are not thought to be of concern.	Landscape and visual aspects have not been included as a key consideration for landfall sites as it is assumed that permanent infrastructure at the landfall would be buried. Any impacts during construction would be temporary in nature.	This site does not lie within any SSSI, though due to its inaccessibility will not be subject to any human disturbance. Offshore, the nearshore area of the site overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA, primarily designated for birds. Arable fields and scrub lie at the top of the cliffs. The coast is designated as Bilsdean Coast Local Biodiversity Site and Thorntonloch Local Geodiversity Site.	This option is accessible via a small track off the A1 (which runs parallel), however only to the cliff tops. The lower beach is not currently accessible, and is covered at high tide.	There are high eroding cliffs of approximately 40 m at this inlet, and a small strip of sandy beach at low tide. There is potential for 0.1 - 0.2 miles of bedrock/till outcrop in nearshore waters (see appended offshore geology figures). Horizontal directional drilling (HDD) would be likely to be required for a landfall at this site due to the height of the cliffs. Neart na Gaoithe (NnG) Offshore Wind Farm cabling and landfall would be installed nearby, thus would need to be taken into account. (This is to the north of this location at Thorntonloch so could be avoided).	
Cove Harbour	The small hamlet of Cove and Cove harbour are of considerable archaeological and cultural importance. The fishing harbour itself was first used in the 1600s, with the extensive tunnel system built in the 1700s and the current harbour completed in 1831. The harbour itself is a Category B listed building (LB6415), as is the entrance to the tunnel system (LB6417) and several of the cottages and sheds (LB6416). There is also a memorial slab at the top of the cliffs commemorating the 'Black Friday' fishing disaster of 1831.	Landscape and visual aspects have not been included as a key consideration for landfall sites as it is assumed that permanent infrastructure at the landfall would be buried. Any impacts during construction would be temporary in nature.	This site lies within the Pease Bay SSSI. Offshore, the site also overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA. The steep cliffs of this SSSI support mesotrophic grassland communities dominated by Arrhenatherum elatius.	This site option is not considered as easily accessible as other options. The site is accessed via a rural road off the A1 roundabout just beyond Dunglass. The road leads through Cove village with residential receptors. From the village, Cove Harbour is only accessible via a public footpath that leads down through a narrow tunnel in the cliffs. There is a small carpark at the top of the footpath. This option would present transport difficulties. However, an alternative may be achievable through fields directly to the south of Cove Harbour, which would also avoid Cove Village.	Site is within Pease Bay SSSI. Steep eroding cliffs of around 30-40m in height. The harbour is surrounded by considerable intertidal and subtidal bedrock and numerous offshore bedrock reefs, and harbour is privately owned and managed and of cultural significance	

Terness Project						
Site	Archaeology & Cultural heritage	L&V Aspects	Ecology & Nature Conservation	Transport & Access	Key Cable Routing Implications/Land Issues	Plan Photographs
Pease Bay	Onshore, there is a non-designated asset of a former grain mill (Canmore ID 181434), but the majority of the site is now a caravan park. The Redheugh coastguard cottages sitting atop the cliffs are noted for contributing to the end of smuggling in the area, through a new style of coastguard watch. Other points of interest include the nearby Siccar point, famous for James Hutton's geological observatory voyage (Canmore ID 349330). Bronze trail markers along the cliff path, created by artist John Behm, are also of importance as they commemorate the 'Black Friday' fishing disaster of 1881 during which hundreds of fishermen were lost in a storm. Offshore, there are recorded losses: an unknown vessel run aground in 1796 (Canmore ID 329457); Maria Emilia (Canmore ID 273276); and the Magicienne (Canmore ID 101610).	Landscape and visual aspects have not been included as a key consideration for landfall sites as it is assumed that permanent infrastructure at the landfall would be buried. Any impacts during construction would be temporary in nature.	This site option lies within the Pease Bay SSSI. Offshore, the site also overlaps with the Outer Firth of Forth and St Andrews Bay Complex SPA. The steep cliffs of this SSSI support mesotrophic grassland communities dominated by Arrhenatherum elatius. The bay is also a nature reserve, managed by the Scottish Wildlife Trust.	This option is convenient to access with an access road connecting to the A1 at a roundabout near Dunglass. The rural road leads up to Pease Bay Leisure Park (caravan site), which has a large parking area and facilities. A tarmac area leads right up to the centre of the beach, providing a large area for potential installation of temporary construction facilities and equipment. However, the caravan park would be a sensitive receptor and therefore an HDD option could overcome some of these issues and allow a small compound to be constructed in fields to the south.	Northern part of the site is within Pease Bay SSSI. Steep eroding cliffs of around 30-40m in height. Offshore bedrock reefs, land constraints behind the beach due to the caravan park - access to the shoreline is through the caravan park. Appended offshore underlying geological figures indicate that the bedrock does not extend as far offshore as some of the northern landfall options.	

Preferred
Some potential issues
Least Preferred

Torness Project Onshore Options Appraisal						
Site	Archaeology & Cultural heritage	L&V Aspects	Ecology & Nature Conservation	Transport	Key Cable Routing Implications/Land Issues	Plan Photographs
Converter Station Options (requires 4ha)						
E2	<p>There are no designated or non-designated assets located within the site. The nearest known heritage assets comprise offshore records of recorded maritime losses (e.g. Nymphe, Canmore ID 195163). The nearest designated asset is the scheduled monument of Thornton Mill enclosure (SM3990), located 1.2km to the south. The site is located on Torness Point, immediately adjacent to the operational Torness Point power station to the west. The site comprises flat ground with some existing infrastructure and hardstanding on it, presumably associated with the adjacent power station, with an area of embankment and cliffs comprising the northern and eastern sides of the site separating it from the North Sea. It is not clear from the information available whether the ground has been extensively disturbed or landscaped, which may have affected the preservation of any previously unknown archaeological remains within the site. Given the significance of the baseline information available, site E2 could be suitable for infrastructure, and is the least constrained of the converter station options considered, with a moderate potential for undisturbed buried remains to be present. Considering the nature of the proposed development, and the distance to and significance of designated assets in the vicinity, it may be possible to scope out impacts on setting at an early stage for a development at this location.</p>	<p>The key benefit of this site would be the proximity of the development to the Torness Nuclear Power Station and would therefore contain industrial structures within a specific area - there would be limited landscape impacts. However, the site is exposed and the development would be clearly visible for visitors to the coastline as well as from residential properties on higher ground inland. Due to the proximity to the power station the short term visual effects would be limited, however Torness is currently only expected to operate until 2030 and if it were to be decommissioned and demolished this would leave the converter station as an isolated structure visually impacting the coastline. If this site were taken forward the proposed development should match the style of the power station as far as possible and therefore give the impression that the converter station is part of the same complex.</p>	<p>This site is immediately adjacent to the Torness Nuclear Power Station and is not within any ecological designations however it does lie immediately adjacent to the proposed Outer Firth of Forth and St Andrews Bay Complex Special Protection Area (pSPA). The pSPA is being proposed in relation to the wintering bird populations it supports as well as its breeding bird assemblage. Wardell Armstrong regarded this site option as having a parish/neighbourhood value in terms of ornithology due to the presence of gull roosts at the time of their site survey.</p>	<p>The site is located immediately to the east of Torness Nuclear Power Station. It is assumed that access to this site could be shared with the power station, which benefits from a high standard of access to the A1, including right turning lane and a wide central reservation. This access will have been used by large HGVs to construct the power station.</p> <p>It is anticipated that abnormal load deliveries will be catered for within the existing access, possibly with minor amendments.</p>	<p>Directly adjacent to coast. Previous discussions with power station owners (EDF) indicated that is unlikely that the site can be secured. Further discussions with EDF indicate that the site is within the nuclear licence area.</p> <p>Site is ALC Grade 3.1</p> <p>Site is within the Torness Nuclear Power Station safeguarded site as defined by East Lothian Local Plan: PROP EGT2</p>	
Substation Options (requires 2.2ha)						
L2 (4.1ha)	<p>The site contains records of two non-designated assets. The first is a record of prehistoric cists (stone-lined burials) having been found in a field in 1913 (Canmore ID 58917). The second is the site of a Hawker Hurricane that crashed in 1940. Within the same field as the site, located 5m south of the site boundary, is record of a former execution site called Witches Knowe, where people condemned as witches were burnt at the stake (MEL1900). In the wider vicinity of the site are: the scheduled monuments of Innerwick Castle, a fort and ring ditch (SM5771) located 355m east of the site, and Castledene enclosure (SM5849) located 250m east-southeast of the site. Before the site can be considered to be suitable for infrastructure, it will be necessary to confirm if the Hurricane crash site is considered a war grave. Given the record of prehistoric cists having been found in the field, and the proximity of the site to Witches Knowe, the potential for the discovery of buried archaeological remains within the site is high. Considering the nature of the proposed development, and the distance to and significance of designated assets in the vicinity, consideration of setting impacts should be considered should this site be taken forward.</p>	<p>Extremely exposed site that is visible from a wide area, including the coastline and National Cycle Route 76.</p>	<p>Small agricultural site which appears to be used as arable, of low ecological value and Wardell Armstrong identified it also as having a low value in terms of ornithology. There is a small area of ancient woodland immediately north of this site but this is not likely to be affected should the substation be placed here.</p>	<p>Access to this site is via Innerwick Junction on the A1 to the west as rural lanes to the east are restricted by the railway and sub-standard junction geometry onto the A1.</p> <p>Abnormal loads could also potentially be taken along this route. There are likely to be some amendments required to junctions and bends along this route, but there are no apparent obstacles to achieving this.</p>	<p>AC cables from Site RSK1 would provide the most direct route. Crossing of A1 and minor roads required.</p> <p>AC cables from Site G/G1 would need to cross Thornton Burn</p> <p>AC cables from Site D2 constrained to south by landfill, crossing of Thornton Burn and Dry Burn required</p> <p>AC cables from E1/E2 would require crossing of A1, railway</p> <p>Site is ALC Grade 3.1</p>	

Preferred
Some potential issues
Least Preferred

Torness Project Onshore Options Appraisal					
	Archaeology & Cultural heritage	L&V Aspects	Ecology & Nature Conservation	Transport & Access	Key Cable Routing Implications/Land Issues
Cable Routing Options					
E1 - DC RC1	The corridor contains no designated heritage assets. The corridor contains numerous non-designated assets. These include: a possible pit alignment at Lawfield (MEL2543); buildings (MEL2376, MEL9349); a World War 2 military camp (Canmore ID 114043) and anti-tank block (MEL9452); references to cropmark remains of a late prehistoric fort (MEL1832) and promontory enclosure (MEL1821) at Thorntonloch; enclosures (MEL11217, MEL1895, MEL11220); ditches (MEL11218), a trackway, pits and ridge and furrow (MEL9636); a ring ditch (MEL1869); and buildings, cropmarks, Mesolithic flint scatters and a lime kiln were identified through archaeological fieldwork in advance of the construction of Torness Nuclear Power Station (Canmore ID 58967). In summary, there is a high density of non-designated assets of likely prehistoric to post-medieval origin identified by aerial photography and geophysical survey within the corridor. Due to the density and extent of identified assets, it will not be possible to avoid them all.	The corridor runs through arable fields to the north of the A1 within LCT 277: Coastal Margins - Lothians. An area with open views towards the coast and inland. Tranquillity is reduced by the presence of transport corridors (road and rail) and industrial development (Torness Nuclear Power Station). The landscape is not designated as highly valued. 3 properties lie within the 200m wide corridor; the closest being Thornton Lock which is within 40m of the corridor. A further 8 properties lie within 100m of the corridor and would likely have views of construction works. One core path is within the corridor for approximately 1.25km. A temporary diversion would most likely be required during construction. Sustrans route 76 lies within the corridor for approximately 1.2km, separated from the route by the A1 which it runs adjacent to. The corridor crosses Thornton Burn and three field boundaries with shrub/trees and a low stone wall flanking either side of the Tornes power station access road.	This corridor is the closest option to the coastline and is adjacent to the Outer Firth of Forth and St Andrews Bay Complex SPA so has the greatest potential of all the routes to affect wintering and breeding birds. It is also adjacent to Bilsdean Coast Local Biodiversity Site. The route crosses Thornton Burn; the river valley is designated as Thurston Burn Valley 2 Local Biodiversity Site and may support Otter and, less likely, Water Vole. The route has the potential to be close to buildings which may support roosting bats or Barn Owl as well as trees which may support nesting birds or bats. The corridor is immediately adjacent to coastal habitats but the actual route would be expected to run through the adjacent grassland and arable fields rather than impacting the coastal margins. Fields may be used by ground nesting or wintering birds but are generally of low value to biodiversity.	The corridor crosses the road serving Thorntonloch and the Torness Nuclear Power Station access roads along with a private access track to Thornly. It may be possible to construct these crossings using trench methods and adopting suitable traffic management. A suitable road crossing at Thorntonloch should avoid residential properties. Access to these locations and along the cable route (from these minor roads) is reasonable from the A1. A temporary access is expected to be required from the A1 to serve the landfall compound, which could be reasonably located around the Bilsdean junction.	Approximate DC Cable length - 2.84km Minor Road Crossings – 4 Watercourse Crossing – 2 (Thornton Burn and unnamed burn) Underground Cable Crossings – Torness Nuclear Power Station cables 400kV & 132 kV
E1 - DC RC2	The corridor contains no designated heritage assets. The corridor contains numerous non-designated assets. These include: a roundhouse and track identified from aerial photography at Linkshead (Canmore ID 347976); cropmarks of ring ditch and possible trackway (MEL1868) at Thorntonloch; geophysical anomalies (MEL11226; MEL11227; MEL11228; MEL11229); possible ditches or pits (MEL11225); a cropmarked enclosure (MEL1896); and an enclosed settlement (MEL1960) and ring ditch or barrow (MEL2786) at Skateraw. Mesolithic flint scatters and a lime kiln were identified through archaeological fieldwork in advance of the construction of Torness power station (Canmore ID 58967). In summary, there is a high density of non-designated assets of likely prehistoric to post-medieval origin identified by aerial photography and geophysical survey within the corridor. Due to the density and extent of identified assets, it will not be possible to avoid them all.	The corridor runs through arable fields to the south of the A1 within LCT 277: Coastal Margins - Lothians. An area with open views towards the coast and inland. Tranquillity is reduced by the presence of transport corridors (road and rail) and industrial development (Torness Nuclear Power Station). The landscape is not designated as highly valued. 1 property lies just within the corridor, with a further 4 within 100m of the RC likely to have views of construction works. The corridor crosses 1 core path and NCR 76 twice as it crosses to the south and north of the A1; therefore temporary closures are likely during construction. The corridor crosses Thornton Burn and a small number of field boundaries with shrub/trees and 2 low stone wall flanking the A1.	The corridor crosses Thornton Burn (and an area designated as Thurston Burn Valley 2 Local Biodiversity Site) which has the potential to support Otter and, less likely, Water Vole. Trees along the burn may support roosting bats and nesting birds. The corridor lies in close proximity to farm buildings which may support roosting bats and Barn Owl. It appears to cross mainly arable or grassland fields which are generally of low value to biodiversity also they may be used by ground nesting or wintering birds.	The corridor crosses the A1 twice and two minor roads, serving Linkshead and Crowhill. Crossings of the A1 will need to be carried out using trenchless (HDD) methods. It may be possible to construct minor road crossings using trench methods and suitable traffic management. Access to these locations and along the cable route (from these minor roads and Power Station access road) is reasonable from the A1. A temporary access is expected to be required from the A1 to serve the landfall compound, which could be reasonably located around the Bilsdean junction.	Approximate DC Cable length - 2.7km Minor Road Crossings – 3 Major Road Crossings – 2 (A1 at two different points) Watercourse Crossing – 2 (Thornton Burn and unnamed burn) Underground Cable Crossings – Torness Power Station cables 400kV & 132kV
E1 – AC RC1	The corridor contains a single designated heritage asset: the scheduled monument of Branxton enclosed settlement (SM5958). The monument comprises the remains of an enclosed settlement of prehistoric date represented by cropmarks visible on oblique aerial photographs. It should be avoided. The corridor contains two non-designated assets: cropmarks of a settlement at Thornton Mill (MEL2561); and 19th-century workers cottages at Innerwick (Canmore ID 295673). The corridor is comparatively less constrained in comparison to E1-AC RC2.	The corridor runs through arable fields crossing to the south of the A1 within LCT 277: Coastal Margins - Lothians. Tranquillity increases somewhat as it progresses west away from the presence of transport corridors (road and rail) and industrial development (Torness Nuclear Power Station) and towards LCT 269: Upland Fringes - a transitional, undulating farmland landscape. The landscape is not designated as highly valued. 2 properties lie within the 200m wide route corridor, with a further 4 within 100m of the corridor likely to have views of construction works. The corridor crosses 1 core path, NCR 76 , therefore temporary closures are likely during construction. The corridor crosses the wooded Thornton Burn and another 3 well established field hedgerow boundaries and 1 low wall.	Crosses Thornton Glen which is a Scottish Wildlife Trust reserve. The reserve is a narrow, steep sided gorge lined with broadleaved woodland which may support roosting bats and nesting birds. The gorge also contains Thornton Burn (and an area designated as Thurston Burn Valley 2 Local Biodiversity Site) which may support Otter and, more unlikely, Water Vole. Appears to mainly cross arable and grassland fields which are generally of low value to biodiversity although they maybe be used by ground nesting or wintering birds. Crosses the railway corridor which may provide suitable habitat for badger and other protected species. There are some buildings in close proximity to the route which may support roosting bats or Barn Owl.	The corridor crosses the A1 and East Coast Main Line in quick succession, as well as potentially the road serving Skateraw. These crossings will need to be carried out using trenchless (HDD) methods, likely as a single drill. The corridor subsequently crosses roads serving Crowhill and Branxton for which it may be possible to cross using trench methods and suitable traffic management, including temporary road widening. Access to these locations and along the corridor (from these minor roads) is generally reasonable from the A1 with some restrictions on the size of vehicle south of the East Coast Main Line due to railway bridges. Height restrictions could affect the transportation of cable drums.	Approximate AC Cable length - 2.38km Minor Road Crossings – 3 - 4 Major Road Crossings – 1 (A1) Watercourse Crossing – 1 (Thornton Burn) Railway Crossing - 1 Underground Cable Crossings – Torness Power Station cables 400kV & 132kV

Torness Project Onshore Options Appraisal					
	Archaeology & Cultural heritage	L&V Aspects	Ecology & Nature Conservation	Transport & Access	Key Cable Routing Implications/Land Issues
E1 – AC RC2	<p>The corridor contains two designated assets. There is the scheduled monument of Crowhill enclosure (SM5770). The monument comprises the remains of an enclosed settlement of prehistoric date represented by cropmarks visible on oblique aerial photographs. It should be avoided. This should be achievable as the width of the corridor clear of this scheduled monument is approximately 150 wide at its narrowest point. The scheduled monument of Castledene Enclosure (SM5849) comprises the remains of an enclosed settlement of later prehistoric date represented by cropmarks visible on oblique aerial photographs. It should be avoided. At present, this corridor is shown as incorporating almost the whole of the scheduled monument. The width of the corridor clear of this scheduled monument is approximately 110m at its narrowest point. The corridor contains numerous non-designated assets. These include: trackways at Innerwick (Canmore ID 349163) and Castledene (MEL10316); cropmarks of rectilinear enclosure at Thornton Law (MEL2499); records of an excavation of a stone circle and cremation at Edinken Bridge (Canmore ID 58919); and remains of the original Edinken Bridge (MEL1897). In summary, there is a considerable number of non-designated assets of likely prehistoric to post-medieval origin identified by aerial photography and antiquarian records within the corridor. Due to the density and extent of identified assets, it will not be possible to avoid them all.</p>	<p>The corridor runs through arable fields crossing to the south of the A1 within LCT 277: Coastal Margins - Lothians. Tranquillity increases somewhat as it progresses west away from the presence of transport corridors (road and rail) and industrial development (Torness Nuclear Power Station) and towards LCT 269: Upland Fringes - a transitional, undulating farmland landscape. The landscape is not designated as highly valued. 3 properties lie within 100m of the corridor with likely views of construction works. The corridor crosses 1 core path, NCR 76 , therefore temporary closures are likely during construction.</p> <p>The corridor crosses the steep sided wooded Dunglass Burn and another a small number of well established field hedgerows and 2 low stone wall boundaries.</p>	<p>Crosses the railway corridor which may provide suitable habitat for badger and other protected species. The corridor crosses a section of North Lammermuir Valleys which are steep side valleys so access may be difficult in this area, trees here may support roosting bats and nesting birds. The corridor crosses Thornton Burn (and an area designated as Dunburn Glass Biodiversity Site) which may support Otter and, more unlikely, Water Vole. Appears to cross mainly arable or grassland fields which are generally of low biodiversity value but may be used by ground nesting or wintering birds.</p>	<p>The corridor crosses the road serving Skateraw, the A1 and East Coast Main Line in quick succession. These crossings will need to be carried out using trenchless (HDD) methods, likely as a single drill. The corridor subsequently crosses a private access track to Railway Cottage and roads serving Crowhill and Branxton for which it may be possible to cross using trench methods and suitable traffic management, including temporary road widening. Access to these locations and along the corridor (from these minor roads) is generally reasonable from the A1 with some restrictions on the size of vehicle south of the East Coast Main Line due to railway bridges. Height restrictions could affect the transportation of cable drums.</p>	<p>Approximate AC Cable length - 2.69km</p> <p>Minor Road Crossings – 4</p> <p>Major Road Crossings – 1 (A1)</p> <p>Watercourse Crossing – 1 (Braidwood Burn, incised)</p> <p>Railway Crossing - 1</p> <p>Underground Cable Crossings – Torness Nuclear Power Station cables 132kV</p>
M – DC RC1	<p>The corridor contains three designated assets. There is the scheduled monument of Blackcastle Hill homestead (SM3916). The monument comprises a prehistoric domestic and defensive settlement. It should be avoided if at all possible. This should be achievable as only a small fraction of the scheduled monument is located within the corridor. There are two further listed buildings within the corridor at Thurston Mains: the Category B-listed steadning cottage (LB7714); and the Category C-listed farmhouse and walled garden (LB7713). All the listed buildings can and should be avoided.</p> <p>The corridor contains three non-designated assets. There is the cropmark of an enclosed settlement and contemporary field boundaries (MEL1906), likely forming part of the scheduled monument of Oldhamstocks Mains (SM5891) located outwith but to the immediate north of the corridor. There are antiquarian records of two burial mounds or cairns at Thurston Mains (MEL1846), and finally cropmarks of a trackway and enclosure at Lawfield (MEL11335). The proposed corridor follows a route which contains steeply sloping ground ascending to a height of 295m AOD. It contains a relatively low density of recorded non-designated assets; however this may in part be due to assets being less readily identifiable through aerial photography in comparison to the flatter, lower coastal areas to the north, and a lower amount of geophysical survey having been undertaken in this area.</p>	<p>The corridor runs through arable and grassland fields to the south of the A1 and railway within LCT 277: Coastal Margins - Lothians. Tranquillity increases as it progresses west away from the presence of transport corridors (road and rail) and industrial development (Torness Nuclear Power Station) and towards LCT 269: Upland Fringes - transitional, undulating farmland landscape. The landscape is not designated as highly valued. 2 properties lie within the corridor with views of construction works likely screened by vegetation.</p> <p>The corridor crosses 1 suggested link on quiet roads.</p> <p>The corridor crosses Ogle Burn and Dunglass Burn where tree cover is less dense, two linear belts of ancient woodland - long established plantation and several field hedgerow boundaries.</p>	<p>This corridor passes through mainly arable and grassland fields which could be used by ground nesting or wintering birds but are generally of low ecological value. The corridor crosses through a small area of long-established woodland (of plantation origin) as well as over the Ogle Burn which may be used by Otter and, less likely, Water Vole. Before reaching M, it passes through a small section of the North Lammermuir Valleys which are steep sided valleys so access may be difficult in this area and trees here may support roosting bats and nesting birds. The corridor here also passes in close proximity to farm buildings at Thurston Mains which may support roosting bats or Barn Owl. In addition, there is a pond at Grey's Acre which would need consideration with regard to Great Crested Newt. The corridor also crosses Thornton Burn and Dunglass Burn Local Biodiversity Site.</p>	<p>The corridor crosses the road serving Birnieknowes and/or two other local roads up to 3 times (close to site H), followed by the Branxton to Oldhamstocks Road and the road serving Cocklaw before turning west and crossing the road serving Thurston Mains. All of these crossings are minor roads and may be possible to cross using trench methods and suitable traffic management, including temporary road widening. Access to these locations and along the cable route (from these minor roads) is generally reasonable from the A1 with some restrictions on the size of vehicle for locations between landfall and Branxton due to railway bridges. Access to Thurston Mains is reasonable as there are no railway bridges. Height restrictions could affect the transportation of cable drums. Access to the section across Cocklaw Hill / Blackcastle Hill will require a lengthy haul road, though a track exists to the masts that could be utilised.</p>	<p>Approximate DC Cable length - 6.62km</p> <p>Minor Road Crossings – 6</p> <p>Watercourse Crossing – 3 (Thurston Mains Burn, Ogle Burn, Bilsdean Burn) plus tributaries</p> <p>Private Water Supplies - 3 within 500m of route</p> <p>Railway Crossing to landfall - 1</p> <p>Major Road Crossings to landfall– 1 (A1)</p> <p>Overhead Line Crossings – 2 (Torness Eccles, Torness Crystal Rig)</p>
M – DC RC2	<p>The corridor contains the following scheduled monuments: Thurston enclosures and ring ditch (SM5870 and MEL1857), the prehistoric remains of a series of enclosures and a ring ditch house; and Thornton Mill enclosure (SM3990), the prehistoric remains of a funerary enclosure or barrow. Both of these appear as cropmarks visible on oblique aerial photographs. They should be avoided if at all possible. This should be achievable for Thurston enclosures (SM5870), as only a small fraction of the scheduled monument is located within the corridor; however the full extent of the Thornton Mill enclosure (SM3990) is located within the corridor. The corridor contains numerous non-designated assets. These include: cropmarks of a trackway and enclosure at Lawfield (MEL11335); a possible enclosure at Harp Law (MEL6334); settlements at Thornton Mill/Thornton Burn (MEL2562; MEL2561); a watermill at Thorntonmill (Canmore ID 208836); and geophysical anomalies (MEL11230; MEL11231; MEL11232; MEL11233; MEL11234; MEL11235; MEL11236). In summary, there is a moderate density of non-designated assets of likely prehistoric to post-medieval origin identified by aerial photography and geophysical survey within the corridor, as well as two scheduled monuments. Due to the density and extent of identified assets, it may not be possible to avoid them all.</p>	<p>The corridor runs through arable fields crossing to the west of the East Coast Main Line within LCT 277: Coastal Margins - Lothians. Tranquillity increases as it progresses west away from the presence of transport corridors (road and rail) and industrial development (Torness Nuclear Power Station) and towards LCT 269: Upland Fringes - a transitional, undulating farmland landscape. The landscape is not designated as highly valued. 7 properties lie within the corridor, with a further 2 within 100m of the corridor which could potentially have views of construction works.</p> <p>The corridor crosses 4 suggested links on quiet roads.</p> <p>The corridor crosses Thornton Burn, 2 sections of ancient woodland (long-established plantation) and several field hedgerow boundaries.</p>	<p>The corridor crosses Thornton Burn (and an area designated as Thurston Burn Valley 2 Local Biodiversity Site/ Thorton Glen SWT Reserve) which has the potential to support Otter and, less likely, Water Vole. Trees along the burn may support roosting bats and nesting birds. The corridor crosses through farm buildings which may support roosting bats and Barn Owl. The corridor appears to cross mainly arable or grassland fields which are generally of low ecological value although fields may be used by ground nesting or wintering birds. The section to M passes through two areas of long-established woodland (of plantation origin). Wooded areas may support roosting bats, nesting birds and other protected species. It also crosses a second small burn in this section.</p>	<p>The corridor runs in parallel to the railway on its south side and then alongside the A1 to Innerwick, turning south to cross the north and west minor roads serving Innerwick and subsequently the minor road serving Thurston Mains. It may be possible to construct minor road crossings using trench methods and suitable traffic management including temporary road widening and road closure for the two routes serving Innerwick given the choice of routes available. Access to the eastern section of the cable route would be from the minor roads serving Lawfield and Branxton, both of which are restricted in height on the size of vehicle due to these roads passing beneath the East Coast Main Line. Access to the western section is reasonable from the A1. A temporary access is expected to be required from the A1 to serve the landfall compound, which could be reasonably located around the Bilsdean junction.</p>	<p>Approximate DC Cable length - 6.5km</p> <p>Minor Road Crossings – 7</p> <p>Major Road Crossing to landfall – 1 (A1)</p> <p>Railway Crossing to landfall - 1</p> <p>Watercourse Crossing – 4 (Thornton Burn, 3 land drains)</p> <p>Private Water Supplies - within 500m of route</p> <p>Underground Cable Crossings - 2 (Torness Power Station cables, 400kV and 132kV)</p>

Torness Project Onshore Options Appraisal					
	Archaeology & Cultural heritage	L&V Aspects	Ecology & Nature Conservation	Transport & Access	Key Cable Routing Implications/Land Issues
M – DC RC3	<p>The corridor contains three designated assets: the Category C listed Thurston East Lodge (LB7710); Thornton Mill enclosure (SM3990), the prehistoric remains of a funerary enclosure or barrow, apparent as cropmarks visible on oblique aerial photographs; and Innerwick Conservation Area. They should be avoided if at all possible. This should be achievable for Thurston East Lodge (LB7710); and Innerwick Conservation Area; however the full extent of the Thornton Mill enclosure (SM3990) is located within the corridor. The corridor contains several non-designated assets. These include: cropmarks of a trackway and enclosure at Lawfield (MEL11335); a possible enclosure at Harp Law (MEL6334); settlements at Thornton Mill/Thornton Burn (MEL2562; MEL2561); a watermill at Thorntonmill (Canmore ID 208836); an enclosure and field boundary (MEL1899) and possible settlement (MEL1888) at Corsick Hill; and and a possible enclosure or plantation bank at Thurston (MEL11416). Assuming that the physical footprint of the route follows the existing underground cable which SPEN has advised may require replacement, impacts on previously identified and potentially previously unidentified undisturbed archaeological remains is likely to be minimal. Therefore, this option is likely to be the least impacting.</p>	<p>The corridor runs through arable fields crossing to the west of the East Coast Main Line within LCT 277: Coastal Margins - Lothians. Tranquillity increases as it progresses west away from the presence of transport corridors (road and rail) and industrial development (Torness Nuclear Power Station) and towards LCT 269: Upland Fringes - a transitional, undulating farmland landscape. The landscape is not designated as highly valued. 12 properties lie within the corridor. In addition the southern boundary of the corridor passes through the northern edge of Innerwick where residents at several properties would potentially have views of construction works. Views from properties within Innerwick Conservation Area (which covers the south of the village) are likely to be screened by properties at the north of the village. The corridor passes close runs through the south-eastern corner of Thornton Manor holiday park, and impacts on the park would only be avoided by routing the works through the south of the corridor. The corridor crosses suggested links on quiet roads, therefore temporary closures are likely during construction. It would be difficult for the corridor to avoid ancient woodland to the south of the holiday lodges - approx 60m depth. It crosses Thornton Burn and other well established field hedgerow boundaries.</p>	<p>The corridor crosses Thornton Burn (and an area designated as Thurston Burn Valley 2 Local Biodiversity Site/Thorton Glen SWT Reserve) which has the potential to support Otter and, less likely, Water Vole. Trees along the burn may support roosting bats and nesting birds. The corridor crosses through farm buildings which may support roosting bats and Barn Owl. The corridor appears to cross mainly arable or grassland fields which are generally of low ecological value but may be used by ground nesting or wintering birds. The section to M passes through two areas of long-established woodland (of plantation origin). Wooded areas may support roosting bats, nesting birds and other protected species.</p>	<p>Minor road crossings comprise roads serving Lawfield, Thornton, Crowhill, a private access track to Railway Cottage, the north access road to Innerwick and the road serving Thurston Mains, close to the caravan park. It may be possible to construct minor road crossings using trench methods and suitable traffic management including temporary road widening and road closure for the route serving Innerwick given the choice of routes available. Access to the eastern section of the cable route would be from the minor roads serving Lawfield and Branxton, both of which are restricted in height on the size of vehicle due to these roads passing beneath the East Coast Main Line. Access to the western section and along the corridor (from these minor roads) is reasonable from the A1. A temporary access is expected to be required from the A1 to serve the landfall compound, which could be reasonably located around the Bilsdean junction.</p>	<p>Approximate DC Cable length -5.8km Minor Road Crossings – 7 Major Road Crossing to landfall – 1 (A1) Railway Crossing to landfall - 1 Watercourse Crossing – 4 (3 land drains, Thornton Burn) Underground Cable Crossings – Torness Power Station cables, 400kV</p>
M – DC RC4	<p>The corridor contains one designated asset, the scheduled monument of Castledene Enclosure (SM5849). It comprises the remains of an enclosed settlement of later prehistoric date represented by cropmarks visible on oblique aerial photographs. It should be avoided if at all possible. At present, this corridor is shown as incorporating the whole of the scheduled monument. The scheduled monument is 80m wide within a 200m-wide corridor. The corridor contains several non-designated assets. These include: cropmarks of a trackway and enclosure at Lawfield (MEL11335); cropmarks of a fort at Harp Law (Canmore ID 319172); a post-medieval road bridge at Thornton Bridge (MEL4071); a record of a demolished dovecote at Ford Bridge (Canmore ID 269586); the remains of Edinken Bridge (MEL1897); records of an excavation of a stone circle and cremation at Edinken Bridge (Canmore ID 58919); trackways at Castledene (MEL10316); an enclosure at Thornton Law (MEL2499); a field known as Witches Knowe (MEL1900), where a number of witches are said to have been burnt; cropmarks of trackways and field boundaries or pit alignments at Innerwick (MEL1855); cropmarks of likely geological origin (MEL2180); pit alignments identified from aerial photography at Thurston Mains (MEL1867); and geophysical anomalies (MEL11235; MEL11236). In summary, there is a high density of non-designated assets of likely prehistoric to post-medieval origin identified by aerial photography and geophysical survey within the route corridor. Due to the density and extent of identified assets, it will not be possible to avoid them all.</p>	<p>The route corridor runs through arable and grassland fields to the west of the A1 within LCT 277: Coastal Margins - Lothians for 600m, before turning westwards and heading inland and up the rising landform for a further 1km within LCT 277. Tranquillity increases as it progresses west away from the presence of transport corridors (road and rail) and industrial development (Torness Nuclear Power Station) and towards LCT 269: Upland Fringes - transitional, undulating farmland landscape. After 1.6km the corridor reaches Thornton Bridge and enters LCT 269 (which it passes through for 3.8km before reaching site M1) and is required to cross woodland (around Thornton Burn and Braidwood Burn) and the rising north-eastern slopes of Thornton Hill. There are properties at Thornton in close proximity to the corridor, although views of construction work are likely to be screened by mature vegetation in close proximity to the properties. At Thornton the corridor crosses the East Lothian SLA 4: Monynut to Blackcastle for 300m. The final 2.8km of the corridor continues through undulating (though generally rising) arable farmland, passing approximately 180m south of the village of Innerwick on a ridge of higher ground which overlooks the village and, although dependent on the final location of the route, construction work is likely to be visible from the village. At the point the corridor approaches site M1 it crosses an approximate 60m strip of long-established woodland (of plantation origin). The corridor crosses Thornton Brook, two small mature woodland belts (inc. one which long-established woodland (of plantation origin), up to 17 field hedgerow boundaries and a 300m area of a locally designated SLA.</p>	<p>The route crosses Thornton Burn and Dunglass Burn Local Biodiversity Site which may support Otter and, less likely, Water Vole. This corridor crosses a few areas of the North Lammermuir Valleys which are steep sided valleys in places so access may be difficult. Scrubby areas may support Badger or reptiles. The route crosses through an area of long-established woodland (of plantation origin). The route crosses field boundary with trees which may support roosting bats or nesting birds. There are several buildings on the edge of the route corridor which may support bats or Barn Owl but these are likely to be avoided. Appears to cross arable fields which are generally of low biodiversity value but may be used by ground nesting or wintering birds.</p>	<p>The route corridor crosses several roads including those serving Lawfield, Branxton and Thurston Mains, all of which are minor roads and may be possible to cross using trench methods and suitable traffic management, including temporary road widening. Access to the eastern section of the cable route would be from the minor roads serving Lawfield and Branxton, both of which are restricted in height on the size of vehicle due to these roads passing beneath the East Coast Main Line. Access to the western section would be from the minor road serving Thurston Mains. Access to this location and along the cable route is generally reasonable from the A1 as there are no railway bridges. Access for other construction vehicles is reasonable on all routes.</p>	<p>Approximate DC cable length - 5.5km Major Road Crossing - 1 (A1) Minor Road Crossing - 3 Railway Crossing - 1 Watercourse Crossing – (Braidwood Burn and land drains) Private Water Supplies - 2 within 500m of route Underground Cable Crossings – Torness Power Station cables, 400kV</p>

Torness Project Onshore Options Appraisal					
	Archaeology & Cultural heritage	L&V Aspects	Ecology & Nature Conservation	Transport & Access	Key Cable Routing Implications/Land Issues
M – DC RC5	<p>The route corridor contains four designated assets. The scheduled monument of Castledene Enclosure (SM5849) comprises the remains of an enclosed settlement of later prehistoric date represented by cropmarks visible on oblique aerial photographs. At present, this route corridor is shown as incorporating almost the whole of the scheduled monument. The width of the route corridor clear of this scheduled monument is approximately 122m wide at its narrowest point. Part of the scheduled monument of Braidwood Enclosure (SM5848) is located within the route corridor. It comprises the remains of a small enclosed settlement of later prehistoric date represented by cropmarks visible on oblique aerial photographs. The width of the route corridor clear of the scheduled monument is approximately 150m wide at its narrowest point. Part of the scheduled monument of Branxton Cottage (SM5890) is located within the corridor. The corridor also cotains part of the scheduled monument of Thurston Mains Enclosure (SM5845). All the designated assets should be avoided if at all possible. The corridor contains several non-designated assets particularly at the western end. These include: trackways at Castledene (MEL10316), Innerwick (MEL1855) and Thurston Mains (MEL1890); cropmarks of likely geological origin (MEL2180); pit alignments identified from aerial photography (MEL1867); anomalies identified from geophysical survey (MEL11236); a possible ring ditch (MEL1874) and pit alignment (MEL1859) at Innerwick Farm; an enclosure (MEL2499); an observation post (MEL2650) and a possible prehistoric cursus monument (Canmore ID 346123) and pit alignment (MEL1867) at Thurston Mains. In summary, there is a high density of non-designated assets, particularly of likely prehistoric origin, identified by aerial photography and geophysical survey within the corridor, as well as four scheduled monuments. Due to the density and extent of identified assets, it may not be possible to avoid them all.</p>	<p>The corridor runs through an arable landscape to the south of the A1 and railway within LCT 277: Coastal Margins - Lothians heading west for approximately 1.3km across gently rising landform. Tranquillity increases as it progresses west away from the presence of transport corridors (road and rail) and industrial development (Torness Nuclear Power Station) and towards LCT 269: Upland Fringes a transitional, undulating farmland landscape. The corridor continues west for a further 800m within LCT 269: Upland Fringes through an area including a linear belt of ancient woodland until it reaches residential properties at Old Branxton at which point the corridor turns northwards and heads north for 800m and passes the proposed R1 substation location. To the north-west of site R1 the proposed corridor again turns westward, at the location the corridor turns to the west it crosses an area of undulating landform which includes woodland and the convergence of Ogle Burn and Braidwood Burn and for approximately 120m crosses East Lothian SLA 4 Monynut to Blackcastle. To the east of the corridor at this point, though separated by a small woodland copse, are residential properties at Thornton Law. The corridor continues westwards for approximately 3.2km across arable fields with hedgerow boundaries, the landform along this stretch of corridor is slightly raised and south facing. The village of Innerwick is less than 400m north of the corridor but separated from the corridor visually by a higher ridge of land. A further linear belt of ancient woodland is crossed at the western end of the corridor.</p> <p>The landscape is not designated as highly valued.</p> <p>The corridor crosses four local roads.</p> <p>The corridor crosses Ogle Burn, two linear belts of ancient woodland (long established plantation) and several field hedgerow boundaries.</p> <p>From desk-based analysis only there are approximately three residential properties within the corridor and a further six residential properties within 100m of the corridor.</p>	<p>The corridor crosses Thornton Burn watercourse, and Dunglass Burn Local Biodiversity Site which may support Otter and, more unlikely, Water Vole. The corridor contains a number of areas of long-established woodland (of plantation origin). Wooded areas may support roosting bats, nesting birds and other protected species. In addition, there are buildings present within the corridor and adjacent to it which may support roosting bats or Barn Owls. Otherwise, the corridor crosses mainly grassland and arable fields which are generally of low ecological value although fields may be used by ground nesting or wintering birds.</p>	<p>The route corridor crosses several roads including those serving Lawfield, Branxton and Thurston Mains, all of which are minor roads and may be possible to cross using trench methods and suitable traffic management, including temporary road widening. Access to the eastern section of the cable route would be from the minor roads serving Birnieknowes, Old Branxton and Branxton, all of which are restricted in height on the size of vehicle due to these roads passing beneath the East Coast Main Line. Access to the western section would be from the minor road serving Thurston Mains. Access to this location and along the cable route is generally reasonable from the A1 as there are no railway bridges. Access for other construction vehicles is reasonable on all routes.</p>	<p>Approximate DC cable length - 6.5km</p> <p>Minor Road Crossing - 4</p> <p>Watercourse Crossing – 1 (Braidwood Burn)</p> <p>Private Water Supplies - 1 within 200m of route</p> <p>Overhead Line Crossings – 2 (Torness Eccles, Torness Crystal Rig)</p>
M – AC RC1	<p>The route corridor contains two designated assets. The scheduled monument of Castledene Enclosure (SM5849) comprises the remains of an enclosed settlement of later prehistoric date represented by cropmarks visible on oblique aerial photographs. It should be avoided if at all possible. At present, this route corridor is shown as incorporating almost the whole of the scheduled monument. The width of the route corridor clear of this scheduled monument is approximately 122m wide at its narrowest point. The majority of the scheduled monument of Braidwood Enclosure (SM5848) is located within the route corridor. It comprises the remains of a small enclosed settlement of later prehistoric date represented by cropmarks visible on oblique aerial photographs. The width of the route corridor clear of the scheduled monument is approximately 120m wide at its narrowest point. It should be avoided if possible. The corridor contains several non-designated assets. These include: records of an excavation of a stone circle and cremation at Edinken Bridge (Canmore ID 58919); and remains of the original Edinken Bridge (MEL1897); trackways at Castledene (MEL10316); and enclosure at Thorton Law (MEL2499); cropmarks of likely geological origin (MEL2180); pit alignments identified from aerial photography (MEL1867) and a possible cursus or enclosure (Canmore ID 346123) at Thurston Mains; and geophysical anomalies (MEL11235; MEL11236). The corridor contains more designated assets within it than the alternatives, so is least preferred.</p>	<p>The corridor runs through arable and grassland fields within LCT 269: Upland Fringes - transitional, undulating farmland landscape, relatively tranquil. The landscape is not designated as highly valued.</p> <p>The corridor crosses 1 suggested link on quiet roads.</p> <p>The corridor crosses a section of Dunglass Burn with tree cover, 1 linear belt of ancient woodland (long established plantation) and 3 field hedgerow boundaries.</p>	<p>This corridor crosses a few areas of the North Lammermuir Valleys which are steep sided valleys in places so access may be difficult, trees here may support roosting bats and nesting birds and scrubby areas may support reptiles and Badger. The corridor crosses through an area of long-established woodland (of plantation origin). The edge of the corridor contains Braidwood Burn but it is likely this could be avoided in finalising the route. The corridor crosses mainly grassland and arable fields which are generally of low ecological value although fields may be used by ground nesting or wintering birds. The corridor also crosses Dunglass Burn Local Biodiversity Site.</p>	<p>The corridor crosses only one minor road, serving Thurston Mains. It may be possible to cross this road using trench methods and suitable traffic management, including temporary road widening. Access to this location and along the corridor is generally reasonable from the A1 with some restrictions on the size of vehicle for the eastern end of the route at Branxton due to railway bridges. Access to Thurston Mains is reasonable as there are no railway bridges. Height restrictions could affect the transportation of cable drums.</p>	<p>Approximate AC Cable length - 3.48km</p> <p>Minor Road Crossings – 1</p> <p>Watercourse Crossing – 1 (Thorton Burn, incised)</p> <p>Private Water Supplies - 2 within 500m of route</p> <p>Overhead line crossing – 1 (Torness Crystal Rig)</p>
M – AC RC2	<p>The corridor contains a single designated heritage asset: the scheduled monument of Black Castle Enclosure (SM5850). The monument comprises the remains of an enclosed settlement of prehistoric date represented by cropmarks visible on oblique aerial photographs. It should be avoided. The corridor contains two non-designated assets: Thurston Mains farmsteading (MEL7403) and steading cottage (MEL4314). The corridor follows a route which contains rougher and more undulating ground that is the case for M - AC RC1 and M1,2,3 AC ENG1. It contains a relatively low density of recorded non-designated assets; however this may in part be due to assets being less readily identifiable through aerial photography in comparison to the flatter, lower areas to the north, and a lower amount of geophysical survey having been undertaken in this area.</p>	<p>The corridor runs through arable and grassland fields within LCT 269: Upland Fringes - transitional, undulating farmland landscape which is relatively tranquil. The landscape is not designated as highly valued.</p> <p>1 property lies within the corridor, with a further 1 within 100m of the corridor likely to have views of construction works.</p> <p>The corridor crosses 1 suggested link on quiet roads.</p> <p>The corridor crosses sections of Dunglass Burn and Ogle Burn with tree cover and 1 linear belt of ancient woodland (long established plantation).</p>	<p>The corridor crosses sections of the North Lammermuir Valleys which are steep sided valleys in places so access may be difficult, trees here and dotted throughout the route may support roosting bats and nesting birds. There also appear to be scrubby areas which may support reptiles and Badger. The corridor crosses through an area of long-established woodland (of plantation origin) as well as the Ogle Burn and Thurston Mains Burn which may support Otter and, more unlikely, Water Vole. The corridor also lies in close proximity to a number of farm buildings which may support roosting bats or Barn Owl. In addition, there is a pond at Grey's Acre which would need considered in terms of Great Crested Newt. Otherwise, the route crosses mainly grassland fields as well as some arable fields which are generally of low ecological value although may be used by ground nesting or wintering birds. This corridor also crosses Dunglass Burn Local Biodiversity Site in two places.</p>	<p>The corridor crosses up to two minor roads around Thurston Mains. It may be possible to cross these roads using trench methods and suitable traffic management, including temporary road widening. Access to this location and along the corridor is generally reasonable from the A1 with some restrictions on the size of vehicle for the eastern end of the route at Branxton due to railway bridges. Access to Thurston Mains is reasonable as there are no railway bridges. Height restrictions could affect the transportation of cable drums. Access to the section across the edge of Cocklaw Hill / Blackcastle Hill will require a lengthy haul road, though a track exists to the masts that could be utilised.</p>	<p>Approximate AC Cable length - 2.99km</p> <p>Minor Road Crossings – 2</p> <p>Watercourse Crossing – 2 (Thurston Mains Burn, Ogle Burn - Ogle Burn incised)</p> <p>Private Water Supplies - 2 within 500m of route</p> <p>Overhead line crossing – 1 (Torness Crystal Rig)</p>

Torness Project Onshore Options Appraisal					
	Archaeology & Cultural heritage	L&V Aspects	Ecology & Nature Conservation	Transport & Access	Key Cable Routing Implications/Land Issues
M1,2,3 AC ENG1	The M1 spur of the corridor contains one designated asset, the scheduled monument of Thurston Mains Enclosure (SM5845) and non-designated assets including the excavation of a prehistoric cist burial (MEL1849) and a possible trackway (MEL1890) at Thurston Mains, as well as numerous geophysical anomalies interpreted as possible ditches (MEL11243, MEL11244) and buildings (MEL11242) at Birky Bog Plantation. The M3 spur of the corridor contains one designated asset, the scheduled monument of Woodhall Farm Enclosure (SM5930). The designated assets should be avoided if at all possible. The remainder of the corridor contains one non-designated asset: records for the excavation of a prehistoric cist burial at Thornton (MEL1847). The route corridor contains a lower density of non-designated assets compared to M - AC RC1. Branch M1 should be avoided if possible due to the higher density of designated and non-designated assets in it compared to M2 and M3.	The corridor runs west through an arable landscape for approximately 4.3km and is located entirely within LCT 269: Upland Fringes a transitional, undulating farmland landscape. For the eastern 500m the corridor crosses a large arable field. At this point the corridor crosses a 70m woodland strip and Ogle Burn, the woodland marks the boundary of East Lothian SLA 4 Monynut to Blackcastle, which the corridor runs through for 2.7km before leaving the SLA approximately 950m east of the M2 site. For this 2.7km stretch of the corridor it runs through arable fields with hedgerow boundaries on a slightly raised north-facing landform and directly in between a woodland belt to the north (associated with Thurston Mains Burn and Braidwood Burn, and including linear belts of ancient woodland) and scrub vegetation and trees to the south located on an area of steep north-facing ground which eventually rises to Cocklaw Hill. The western boundary of the SLA, where the corridor exits the SLA, is demarcated by Thurston Mains Burn (Elmscleugh Water). At the western end of the corridor it crosses a section of ancient woodland before entering the M2 site. The landscape is not designated as highly valued, however the majority of the corridor is within the locally designated SLA 4 Monynut to Blackcastle. The corridor crosses one local road. The corridor crosses Ogle Burn and Thurston Mains Burn (Elmscleugh Water), a small area of ancient woodland (long established plantation) and several field hedgerow boundaries. From desk-based analysis there does not appear to be any residential properties within 100m of the corridor. Graded amber due to the length of the corridor within the SLA, does have several positive features such as lack of residential receptors potentially impacted by this route.	The corridor crosses Dunglass Burn Local Biodiversity Site in two locations which has the potential to support Otter and, less likely, Water Vole. Trees along the burn may support roosting bats and nesting birds. The corridor appears to cross mainly arable or grassland fields which are generally of low ecological value but may be used by ground nesting or wintering birds. The spurs to M1,2,3 pass through areas of long-established woodland (of plantation origin). Wooded areas may support roosting bats, nesting birds and other protected species.	The corridor crosses up to two minor roads around Thurston Mains. It may be possible to cross these roads using trench methods and suitable traffic management, including temporary road widening. Access to this location and along the corridor is generally reasonable from the A1 with some restrictions on the size of vehicle for the eastern end of the route at Branxton due to railway bridges. Access to Thurston Mains is reasonable as there are no railway bridges. Height restrictions could affect the transportation of cable drums.	Approximate AC Cable length (from M2 spur) - 4.35km Minor Road Crossings – 2 Watercourse Crossing - 2 (Thurston Mains Burn, Ogle Burn) for M1 spur plus land drain, 3 (Thurston Mains Burn, Ogle Burn and unamed watercourse) for M2 and M3 spurs plus land drain Overhead Line Crossings – 1 (Torness Crystal Rig)
G – DC RC1	The route corridor contains no designated or non-designated heritage assets. However, the cable corridor extends through open arable fields in which other designated and non designated assets are present (e.g. Branxton enclosure scheduled monument SM5958). The route corridor is comparatively short in length, contains no previously identified assets, but - based on the density of remains and the land use in adjacent areas - is in an area where there is the potential for the discovery of previously unidentified remains.	The route corridor runs through arable fields to the south of the A1 within LCT 277: Coastal Margins - Lothians. An area with open views towards the coast and inland. Tranquillity is reduced by the presence of transport corridors (road and rail) and industrial development (Torness Nuclear Power Station). The landscape is not designated as highly valued. 1 property lies just within 200m of the route corridor, unlikely to have views of construction work. The route corridor crosses a small number of field boundaries with shrub/trees.	This route does not cross or lie immediately adjacent to any designated sites. Crosses field boundary with trees which may support roosting bats or nesting birds as well as small burns which may support Otter or, less likely, Water Vole. Appears to cross arable fields which are generally of low biodiversity value but may be used by ground nesting or wintering birds.	The route corridor only crosses the road serving Lawfield, which is a minor road and may be possible to cross using trench methods and suitable traffic management, including temporary road widening or road closure, given the route choice available. Access to this location and along the cable route (from this minor road) is restricted in height on the size of vehicle immediately to the north of the route, although vehicles could route via Birnieknowes as an alternative. Reasonable access is therefore available for construction vehicles.	Approximate DC Cable length - 1km Minor Road Crossings – 1 Major Road Crossings – 1 (A1) Watercourse Crossing - 2 land drains Railway Crossing - 1
G - AC RC1	The corridor contains no designated heritage assets. It contains a single non-designated asset: Lawfield enclosure and trackway (MEL11335). The corridor extends through open arable fields. The corridor is comparatively short in length, contains a low number of previously identified assets, but - based on the density of remains and the land use in adjacent areas - is in an area where there is the potential for the discovery of preivously unidentified remains.	The corridor runs through arable fields to the south of the A1 within LCT 277: Coastal Margins - Lothians. Tranquillity increases as it progresses west away from the presence of transport corridors (road and rail) and industrial development (Torness Nuclear Power Station) and towards LCT 269: Upland Fringes - a transitional, undulating farmland landscape. The landscape is not designated as highly valued. 1 property lies just within the 200m corridor with likely limited views of construction works. The corridor crosses a small number of field boundaries with little in the way of hedgerow/trees.	This corridor does not cross or lie immediately adjacent to any designated sites. Crosses a small burn which may support Otter or, less likely, Water Vole. Appears to cross arable fields which are generally of low biodiversity value but may be used by ground nesting or wintering birds.	The corridor does not cross any roads. However, access to the cable route would be from the minor road serving Lawfield and separate minor road serving Branxton, both of which are restricted in height on the size of vehicle due to these roads passing beneath the East Coast Main Line. Reasonable access is achievable for most construction vehicles, though height restrictions could affect the transportation of cable drums.	Approximate DC Cable length - 800m Underground Cable Crossings – Torness Power Station cables, 400kV

Preferred
Some potential issues
Least Preferred

The above assume a landfall at southern end of Thorntonloch (via 2 alternative indicative landfall compounds) and a substation at R1/R2